

THE HALAL
TOURISM BOOM

FLOWER PICKERS
OF LINCOLNSHIRE

THE FADING DAYS OF
MOROCCO'S GRAND TAXIS

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BEAVERS ARE BACK

THE INDUSTRIOUS RODENT HAS RETURNED
TO BRITISH WATERS AND THE
RESULTS ARE ASTONISHING



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A consultation is underway to officially return beavers at the national level across Britain. Conservationists hope that the species will revive nature's intrinsic messiness for the benefit of all.



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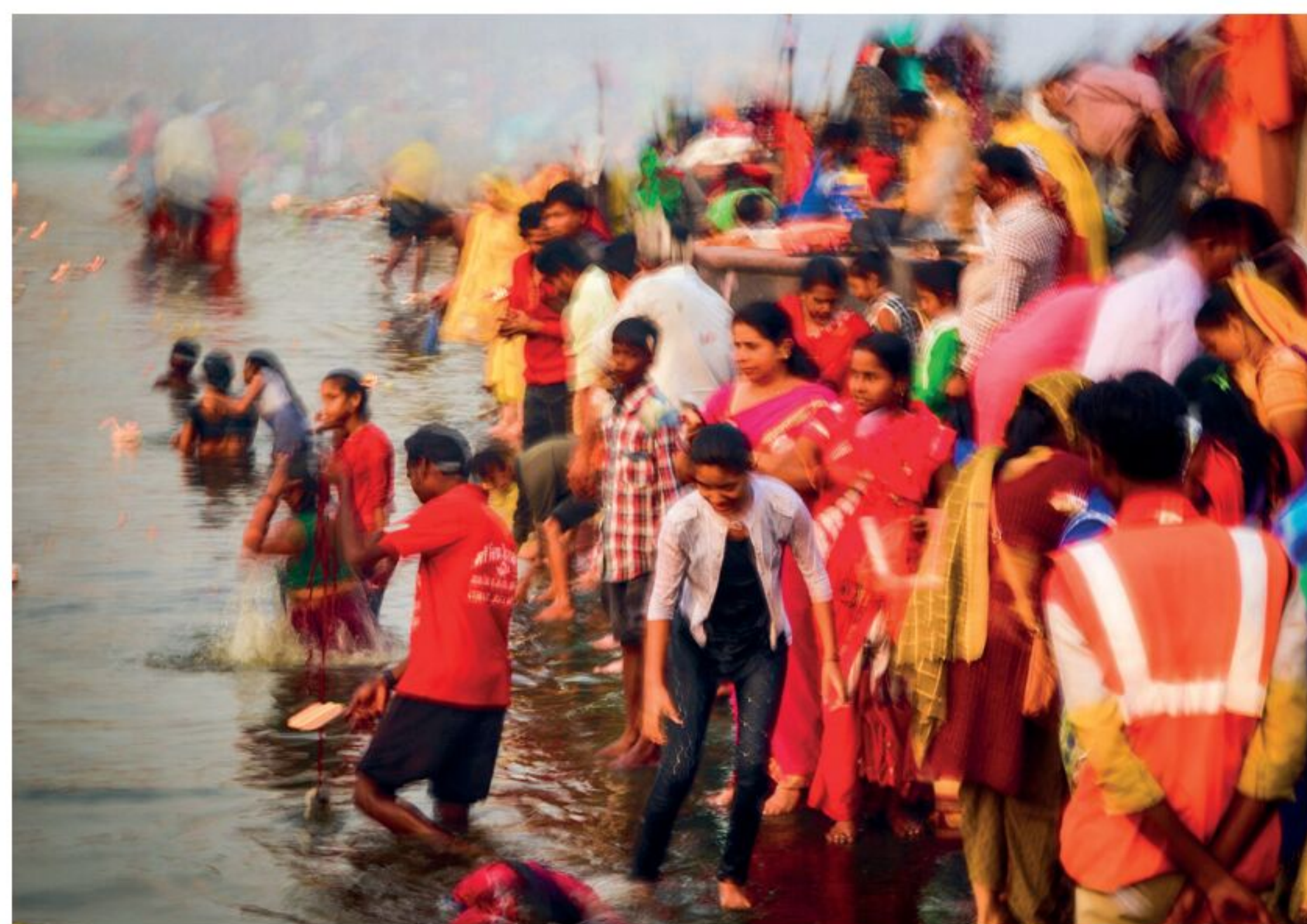
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WELCOME

Wonders all around...

We certainly zip around the world in this issue of *Geographical*, from the fields of Lincolnshire, to the bustling port city of Essaouira in Morocco, and on to Trentino – the lush landscape long passed between Italy and Austria. But it is here in the UK that we start the journey, specifically on the banks of a small stream in Cornwall where an experiment is taking place – one that involves beavers. We had no concerns about referring to the ‘astonishing’ results of beaver reintroductions on our cover. As **Jacob Dykes** discovers on **page 24**, the impact these rodents have on their environment, and on ours, is indeed remarkable. By simply going about their business, they encourage the boggy marshes once common across our land. These landscapes play a hugely important role in flood defence.

Elsewhere on this island, we highlight a much more manicured landscape. On **page 63** photographer **Tessa Bunney** travels to Spalding in Lincolnshire, where workers toil over the soil, not for crops, but for cut flowers. I am fascinated by the people and places that produce the goods we city-dwellers take for granted.

And then we are off. On **page 40** we pay a visit to Morocco’s last grand taxi drivers – a trade gradually mutating as the government tries to fade out polluting diesel vehicles, against some people’s wishes. And, on **page 50**, **Chris Fitch** reports from the forests of Trentino, where some of the most precious trees on Earth (particularly for music lovers) are struggling in the face of vicious storms.

Plus, don’t forget that a subscription to *Geographical* or membership to the RGS-IBG makes a fantastic Christmas present for that tricky customer who has it all! Details for the latter on **page 74**.

Katie Burton
Editor

CONTRIBUTORS



'I became fascinated by the history of cut flower production in Lincolnshire, from the draining of the fenland in the 19th century through to the rise and demise of cut flower growing and bulb production in the Spalding area,' says **Tessa Bunney (page 63)**. 'Along with Caroline Beck, in *The Flower Fields*, I explore how technology is changing how we grow flowers in this country.'



'The River Ganges in India is a source of life and an object of veneration for hundreds of millions of Hindus, but at the same time it is abused by many of the same people who hold it in such high regard,' says **Stuart Butler (page 32)**. 'Up and down the length of the river, small and dedicated groups of people are working against the odds to try and clean it. Hearing their stories was inspirational.'



'The relationship between man and machine is fascinating to explore, especially in Morocco where old taxis, mostly transported to the country from their first homes in Europe, ooze soul,' says **John Silcox (page 40)**. 'Hitching a ride across the country was more than a road trip: it revealed the mechanics of local culture, while delivering an important lesson on global life.'

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Iceland fieldtrip

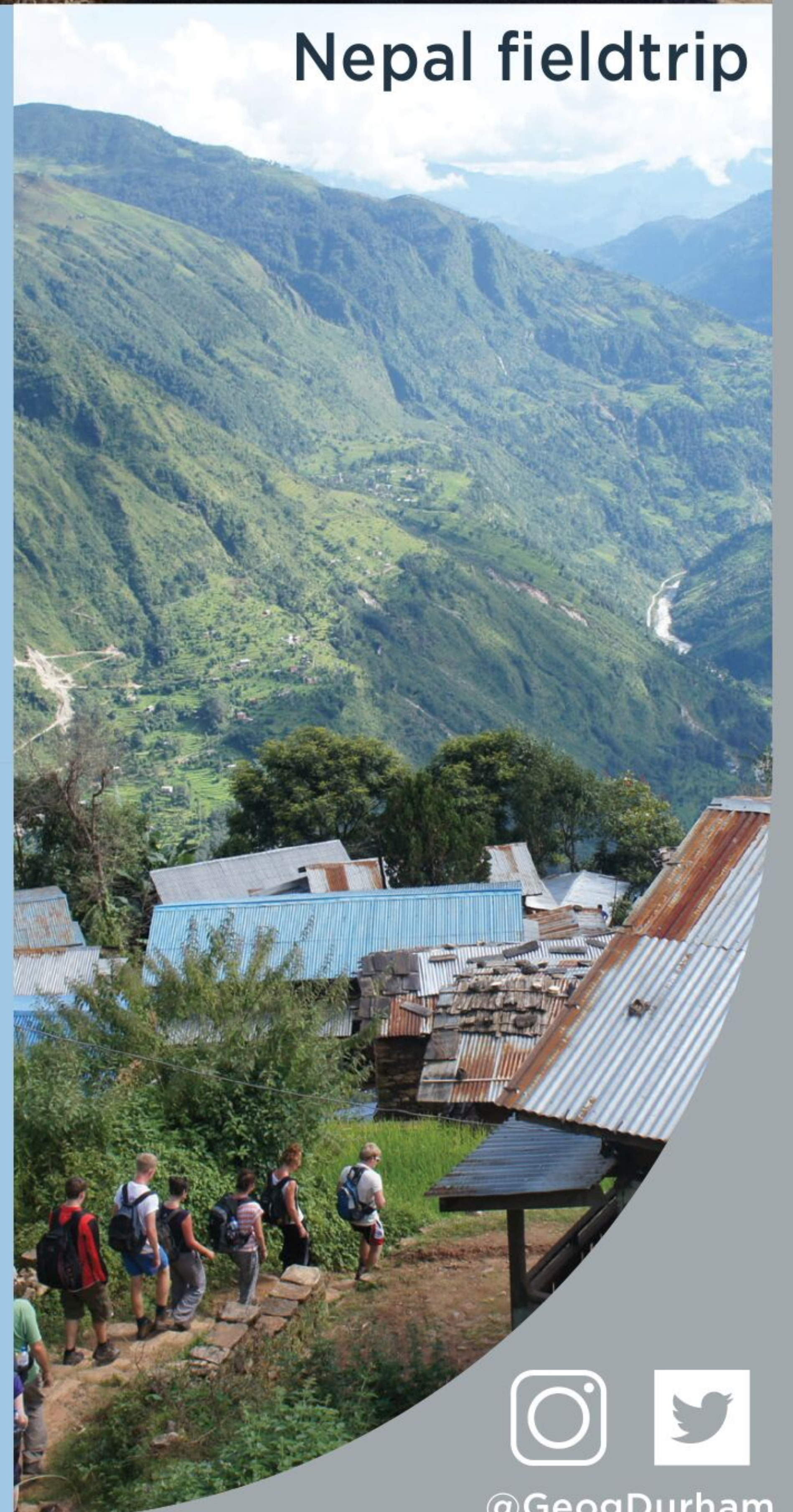


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WORLDWATCH

WILDLIFE AND LANGUAGE

MEETING OF MINDS

An overlap between populations of grizzly bears and Indigenous groups points to a wider phenomenon known as 'biocultural diversity'

When scientists started to work in the dense pine forests of British Columbia to analyse the DNA of grizzly bears, they discovered three distinct, genetically different groups. The bears were spread across an area of 23,500 square kilometres – land that falls within the territories of the Nuxalk, Hailzaqv, Kitasoo/Xai'xais, Gitga'at, and Wuikinuxv Indigenous nations, groups associated with three Indigenous language families. This latter fact proved to be hugely significant.

According to Lauren Henson, a researcher at the Rainforest Conservation Foundation, who co-led the study, none of the geographical divides that you might think would explain the formation of three different bear groups – water barriers, terrain ruggedness, ice or snow – turned out to have any real relevance. Instead, 'the

genetic groups of grizzly bears actually corresponded to the spatial locations of Indigenous language families.' She believes that this is the first time that a species' genetic co-occurrence with human language has been documented. The research indicates that both bears and people maintain familial links to territories that have been passed down through generations. It suggests a parallel in the resources used by both bears and people, but also a cultural equivalency between the two.

This phenomenon, part of what is called 'biocultural diversity' (the idea that there are links between biodiversity and cultural diversity) has long existed. Larry Gorenflo, a professor at Penn State College in Pennsylvania, is fascinated by the concept. In 2012, his research team analysed the geographic ranges of more than 6,900 human languages to examine their overlap with biodiversity. A total of 3,202 languages, nearly half

of those on Earth, were found to occur within just 35 'biodiversity hotspots' – regions with an abundance of endemic species. Small biodiversity hotspots in the East Melanesian Islands, the Guinean Forests of West Africa, Indo-Burma, Mesoamerica and Wallacea each harboured more than 250 different languages.

There are two main theories that seek to explain the high numbers of languages within biodiverse areas. The first holds that because humans living in rich, biodiverse areas would have had access to more resources when languages were evolving, the ability to communicate across a wide area would have been less important. 'You can keep your own thing going on instead of learning somebody else's language,' says Gorenflo. The second, more global theory, suggests that the expansion of people, crops and diseases from Europe gradually reduced cultural and

Hotspot: Sudan
Another military coup
pushes progress back

Freedom to tinker
UK rules on gene-
edited crops eased

Shapeshifters
The animals adapting
to global warming

In British Columbia, genetic
clusters of bears were
found to correlate with
Indigenous language groups



NATURESMOMENTSUK/SHUTTERSTOCK

linguistic diversity around the planet, but disproportionately affected less biodiverse areas. 'Temperate zones were colonised by Europeans, who were more comfortable there than in the tropics,' Gorenflo explains.

Either way, 'understanding the relationship is important because linguistic diversity and biodiversity loss are co-occurring,' says Gorenflo. Language loss in many of the world's biodiversity hotspots, such as the Americas, has reached 60 per cent in the last 35 years. 'The connections are so entwined that I'm not sure we can conserve biodiversity without conserving cultural and linguistic diversity.'

Many conservationists point to this co-occurrence as a manifestation of Indigenous people's deep connections with natural landscapes. In British Columbia, for example, 'the first Five Nations Indigenous peoples have been stewarding the land for thousands of

years,' says Henson. She and Gorenflo both advocate for increased involvement of Indigenous communities within conservation programmes; the grizzly bear study was conducted with the involvement of the governments of the relevant Indigenous nations.

It's a subject that has long been debated in conservation circles and was brought to the fore once again at the recent COP26 climate conference. Some Indigenous people have pointed to the fact that the hurried creation of new protected areas could lead to displacement of Indigenous groups, removing the people with the deepest understanding of the landscape. Many would like to see legal ownership of such territories given to Indigenous peoples. Gorenflo believes that this would serve the dual purpose of preserving the cultural integrity and linguistic diversity of such groups, while ceding control to communities who better understand the land and its inhabitants.

In some areas, such a conservation strategy is already proving effective. Earlier this year, the UN Food and Agriculture Organisation released a report showing that Amazonian deforestation rates were significantly lower in areas where Indigenous and tribal land rights had been formally recognised. Moreover, areas managed by Indigenous peoples have the highest abundance of wildlife. A 2019 study of more than 15,000 geographical areas across Canada, Brazil and Australia found that the total numbers of birds, mammals and amphibians are highest on lands that are managed by Indigenous communities.

'Not all have the same outlook,' says Gorenflo. 'But in many cases, Indigenous peoples don't want to exploit natural resources. If you know that your and your descendants' futures depend on the way you manage natural resources, you'll probably take better care of them.' ●

Freedom to tinker

The UK is liberalising the rules around gene-edited crops

In the wake of the UK's departure from the EU, a change is coming. On 29 September, the Department for Environment, Food and Rural Affairs announced that by the end of 2021, researchers planning to conduct field trials of gene-edited plants will no longer be required to submit lengthy and expensive risk assessments. Many scientists believe that the change will bolster the nation's capabilities in food-security research amid rapid environmental change.

The UK had previously followed the EU's policy on gene-edited crops, which placed them under the same stringent regulations as genetically engineered crops. However, there are important distinctions between the two. Traditional genetic engineering inserts large sections of DNA from one plant species, known as 'transgenes', into another plant's genome. Gene editing, in contrast, allows researchers to make precise, targeted changes using the plant's own DNA (transgenes are never involved). 'Under the EU regulations, if you've made small edits to a gene, you have to treat it like it's a genetically modified organism,' says Nigel Halford, a crop scientist at the Rothamsted Research Centre. 'However, modern gene-editing techniques – such as CRISPR/Cas9 – allow for much more precise alterations to DNA, reducing some of the concerns that surrounded genetic-engineering.' Policy has not kept pace, researchers argue.

Halford and many other crop scientists believe that gene-editing is merely an acceleration of the way plants naturally breed – a process of gradual genetic change that humans have long taken advantage of through selective breeding. 'A lot of the edits that we're making might take place during natural reproduction,' he says. 'DNA mutations occur all the time – without them, you don't get evolution.'

Cathie Martin, professor at the John Innes Research Centre agrees. 'A lot of the gene-edited changes could occur naturally, but it would take a lot of time and effort to screen them, identify them and integrate them into crops,' she says. 'With gene editing, you're accelerating that process, saving huge amounts of time, effort and money.'

Halford's team is working on gene-editing certain crops to ensure that they produce less of the carcinogenic substance acrylamide, which can form during cooking. They have used the CRISPR/Cas9 system to knock out some of the genes involved in acrylamide production. Similarly, Martin's team is working to increase the amount of ascorbate, a precursor for vitamin C, by gene editing tomatoes. Such techniques, if commercialised, could help to solve nutritional issues and improve food security.

Under the previous EU regulations, research and commercialisation of genetically modified crops – which applied to gene-edited varieties – was slow to get off the ground. 'There has been a strong disinclination to fund anything that involves a genetically modified crop,' says Martin. Halford adds that, because of the regulatory obstacles, the EU hasn't had an application to cultivate a genetically modified crop in the past ten years. The UK policy changes come with a potential reduction in financial risk for investors. 'When we're talking about something that is nature-equivalent in gene editing, I think it will at least allow funders to look more favourably,' says Martin.

'Researchers and developers need to be confident that what they're working on could have potential application and commercialisation. There needs to be an enabling regulatory framework for research to get off the ground,' adds Halford.

Of course, concerns about unnatural tinkering with



Few of the crops that we consume today are free from human meddling

VELTMAN34/SHUTTERSTOCK

nature are unlikely to ever go away entirely. Halford responds to such claims by pointing out that most modern crops are already unnaturally cultivated. 'Hexaploid wheat – the kind we grow today – doesn't exist in the wild,' he says. 'Most wild potatoes are toxic. Wild oil seed rape produces hydrogen cyanide and oxalate, poisonous traits that have been bred out.' Cultivators created safer varieties of these crops using mutagenesis, which involves changing DNA with chemicals and radiation, before selecting the favourable varieties that emerged.

Outside the EU, some gene-edited crops have already reached the commercialisation phase. The first was a crop used to make soya-bean oil with a longer shelf life, launched in 2019 in the USA. Japanese consumers can now buy tomatoes of the Sicilian rough high GABA variety, touted to produce more nutritional amino acids. And in Argentina, which has more liberal regulations on gene-editing research, Bioheuris – a plant biotech company – plans to commercialise its herbicide-resistant soya bean and sorghum soon. 'The reality is that we're simply not leaders in the gene-editing field in this country – there's much more innovation in America, South America and Asia. However, we have people who are desperate to try to produce new crops and improve the UK's agricultural credibility,' says Martin.

Perhaps most pressingly, researchers believe that it's essential to ready crop research for a rapidly changing environment. 'Let's look at what we're already experiencing: drought, flooding, heat, high CO₂, lack of fresh water, rising populations and increased crop consumption,' says Halford. 'Crop improvement – whether that's through gene editing or traditional mutagenesis – takes time. If we're going to develop more climate-resilient crops, we need to get started now.' ●

CLIMATEWATCH

Pricing decarbonisation



With energy bills soaring across Europe, **Marco Magrini** explains that putting a price on fossil fuels has consequences

Get ready – winter is coming. The winter solstice will occur on Tuesday, 21 December at 15:59 GMT sharp. A dreadful menace will soon be hanging over Europe.

Thanks to several technical, political and some downright unfortunate circumstances – including a lack of wind in summer and Russia restricting its supply – gas inventory levels have eroded to historic lows. In turn, electricity bills have soared to unimaginable highs. A chilly winter, energy experts warn, could lead to gas shortages and, consequently, to widespread blackouts.

Policymakers in both Britain and Europe have three options: increase gas supplies, ramp up coal-fired plants or reduce consumption. Unfortunately, a huge increase in gas stocks is almost impossible at this stage. Resorting to coal would be inappropriate to say the least – particularly in the wake of all the grand promises we heard at COP26. And, in order to reduce consumption, prices would have to be even higher.

The idea that gradually raising the cost of fossil fuels will promote the adoption of renewable energy – a so-called 'market-based approach' – has always been at the heart of climate change negotiations and carbon markets, such as the EU's Emissions Trading System (ETS). Here, energy-hungry industries that have been granted 'allowances' to emit carbon dioxide can trade them. Those that need to produce more CO₂, buy; those with a surplus, sell. In September, these allowances reached a record-high price of €65.77 per tonne of CO₂ equivalent. This carbon price gets added to energy bills – which means that the more we rely on fossil fuels, the higher energy bills rise.

As part of its Green Deal package, the EU was preparing to extend the ETS to road transport and heating – in other words, to small businesses and households. But with energy prices already skyrocketing, the project may turn out to be unfeasible. European leaders well remember what happened in 2018 when French president Emmanuel Macron raised fuel taxes to discourage the use of fossil fuels – the move ignited the *gilet jaunes* protests. On the other hand, going back on the plan may render the bloc's climate targets for 2030 simply unreachable.

Meanwhile, China and India have been struggling with power cuts sparked by coal shortages. Oil, natural gas and coal prices have all risen worldwide and the crisis could go global. Let's face it: decarbonisation is far from simple.

SHAPE

shifting

Climate change is playing havoc with natural systems, but some animals are already adapting

Each spring, 30,000 grey-headed flying foxes arrive in Yarra Bend Park on the outskirts of Melbourne, ready to give birth to pups after their coastal winter migration. But last year, when December temperatures reached 43°C, 15 per cent of the colony died and dropped from the trees. If the species had only managed to evolve larger ears, wings or limbs to cope with the heat, many might have been spared.

A new study from researchers at Deakin University in Geelong suggests that many species are doing just that in response to global warming, effectively 'shapeshifting' by increasing the size of their appendages – bills, legs and wings – to help them shed excess heat. 'Long limbs, tails, ears or beaks increase surface area,' says Matthew Symonds, one of the study's authors, 'so having bigger appendages in a warmer climate is an advantage because it allows animals to shed heat faster.'

The changes are subtle but noticeable. Combing back through data and examining museum specimens, the researchers found that species such as Australia's mulga parrot, the gang-gang cockatoo and the red-rumped parrot have increased the surface area of their bills by 4–10 per cent since 1871. 'Bills are highly vascularised, uncovered by feathers, and are primary sites of heat exchange with the environment,' says Symonds. Outside Australia, they found that the North American dark-eyed junco shows a similar response to the Australian parrots; that many shrew species are evolving longer ears, tails and



Research suggests that some shrews, such as this common shrew in the UK, now have longer ears, tails and legs

legs; and that the wing size of many bat species is increasing.

Rapid evolution in response to climate change is not only being driven by rising temperatures, but by the increased severity and frequency of dangerous weather events. In 2018, a team led by Colin Donihue of Harvard University found that after Hurricanes Irma and Maria, 188 species of *Anolis*

lizards rapidly produced larger toepads, which help them to grip onto branches during storms. Last year, the team published follow-up research, focusing on later generations of the same lizard population. The changes were inherited by the next generation, leading the team to conclude that extreme weather events are already having profound effects on the evolutionary trajectory of lizards.



Anolis is a genus of lizards comprising hundreds of species. Following Hurricane Irma, researchers found that 188 *Anolis* species had produced larger toe pads

BELOW LEFT: ERNI ABOVE: SILENT SHOOT BELOW: DAVID C SIMON BELOW RIGHT: WALTER COATE ALL SHUTTERSTOCK



Researchers studied historical data relating to the gang-gang cockatoo, found throughout south-eastern Australia



The dark-eyed junco, native to North America, has shown signs of adaptation to global warming

Animals are also making other, more worrying, changes in response to climate change. A 2018 analysis published in the journal *Nature* showed that animal species have shifted their seasonal cycles by 2.88 days per decade in response to climate change. Some seabirds, for example, are changing the time at which they lay eggs in response to reduced sea ice, a move that ripples

through ecosystems. Similarly, when flowers bloom later, following shorter winters, pollinating insects and birds are also affected. In many regions, nectar-rich flowers are blooming weeks before migratory species, such as hummingbirds, arrive.

All of these changes place selective pressure on those that can't adapt. 'Part of the problem is that generalist species are

often being selected over specialists – those that have a narrow range of conditions in which to survive,' says Jeremy Cohen, who teaches climate change ecology at Yale University. 'Animals that can cycle through generations faster, and therefore acquire new traits more rapidly, are also being favoured.' For many, however, the pace of climate change will simply be too rapid.

SUDAN

When the tear gas has cleared, and the internet switched back on, the most likely scenario for

Sudan is for it to continue the cycle it has known for too long: military coup, followed by steps towards a nascent democracy, then back to military coup. That may be a bleak view, but Sudan has few concrete blocks available with which to cement together a cohesive society or a democratic nation state.

In early November, protesters were on the streets demanding that the military return to the route mapped out for a transition to democracy, drawn up after the toppling of the dictator Omar al-Bashir in 2019. It's not happening. The Sovereign Council, a power sharing mechanism between army and civilian leaders was dissolved last month after General Abdel Fattah al-Burhan moved to 'correct the course of the people's revolution' and preserve the stability of the country. The general was due to step down as head of the Sovereign Council next month, which would have increased civilian power. Coincidence?

Here's another one. The civilian prime minister, Abdalla Hamdok, had recently been criticising military-owned companies and their alleged corruption. And a third: al-Bashir will go on trial for war crimes at some point and is likely to name General al-Burhan and others over the atrocities committed in Darfur. Then there's the investigation into the massacre of civilians in Khartoum in 2019 to think about.

Far from taking steps toward democracy, the military put Hamdok under temporary house arrest – democracy did not pass go. Burhan says he'll hold elections in 2023, hardly a speedy timeline. He's announced he won't stand for office which is as reliable a promise as that made in July by Tunisian president Kais Said when he announced a one-month suspension of parliament. It's still suspended.

A 2023 election is possible. It



Tim Marshall is a journalist, broadcaster and author of *Prisoners of Geography* and *Divided: Why We're Living in an Age of Walls*



gives Burhan plenty of time to ensure an outcome favourable for the army. These days, dictators like to give the impression they are democrats; voting slips act as good fig leaves with which to cover their inequities. Sudan has dozens of political parties and many of them are based on ethnic, religious, or tribal lines. The same is true for what passes for civil society which is poorly organised. It's a lot easier to have a deep state if you have shallow civil society.

This recent coup threatens the relative stability Sudan has achieved since 2019. Two major rebel forces which had backed Prime Minister Hamdok and were engaged in peace talks are now considering their options, meaning the conflicts in Darfur and the Nuba Mountains may be revived. It also endangers the

debt-relief package Hamdok had recently negotiated and complicates various foreign financial aid packages. Saudi Arabia and the UAE will probably put in enough money to prevent a financial collapse, but despite eventually joining most other countries in urging a return to civilian rule, their criticism of the coup has been muted. In return for massive aid donations Sudan sent thousands of troops to fight in Yemen at the behest of the two countries and both see Burhan as a bulwark against an Islamist takeover of Sudan.

We are seeing a spread of instability across the Horn of Africa as whole. The war in neighbouring Ethiopia between the government and Tigrayan forces could engulf the rest of the country. Eritrea has already involved itself, the Afar region of Djibouti is not immune from the fall out, and if the Ethiopian civil war spreads to its Somali region it could reignite violence along the border with Somalia. The Kenyan border is tense due to the number of Ethiopian refugees who have crossed into Kenya, while refugees from conflicts in South Sudan have been sheltering in Ethiopia.

If Sudan looks to its neighbours for a model of good governance it sees Libya, Egypt, Eritrea, Ethiopia, South Sudan, Central African Republic, and Chad. Help establishing a democracy will not come from there. Building it from within is complicated by the tribal make-up of the country. The two main political entities, the National Ummah Party and the Democratic Unionist Party, both promote Arabic culture despite Sudan's rich mosaic of very different peoples. One of the reasons South Sudan fought to become independent was because Khartoum refused basic rights to Christian and animist tribes.

In a country with 57 ethnic groups, and over a hundred languages, forming stable political coalitions, whose aim is to better the lives of everyone, is not always the primary goal of those in charge. Now there's a two-year hiatus before they can even give it a try.



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A jaguar swims in Brazil's Pantanal wetlands

Aquatic jaguars

WALTER MARIO STEIN/SHUTTERSTOCK

■ Jaguars in a northern region of Brazil's Pantanal wetlands have been seen fishing and travelling together co-operatively. Ecologists from Oregon State University deduced two things: that jaguars are not, in fact, solitary mammals whose interactions are limited to courting displays or territorial disputes; and that this population represents the first ever known to feed on a mostly aquatic diet. They also calculated that jaguar density was 12.4 individuals per 100 square

kilometres – the highest ever reported and three times higher than estimates for other jaguar-rich regions of South America. The researchers believe that the abundance of aquatic prey has increased the density of the population.

They predict that all of these factors have helped to break down the traditional territories that jaguars are known to fiercely guard, instead affording them more time, energy and space for social interaction.

Tuskless

■ Ivory poaching has led to the spread of a rare genetic mutation that causes tusklessness in African elephants, according to a study published in *Science*. Researchers exploring why elephants in Gorongosa National Park, Mozambique, were increasingly being born without tusks realised that tuskless elephants were prime targets during the Mozambican civil war, which ran from 1977 to 1992. Ninety per cent of the elephant population was killed to help finance the conflict through ivory sales. Tuskless elephants were more likely to survive, breed and pass on the 'tusklessness' gene to later generations.



A male elephant with broken tusks in Botswana

CHERYL RAMALHO/SHUTTERSTOCK

Pipped to the post

While transcribing an essay from 1345, Latin literature expert Paolo Chiesa found evidence that sailors from Genoa were already aware of North America before Christopher Columbus 'discovered' it. The revelation – stemming from the document *Cronica universalis*, written by Galvaneus, a Dominican friar – was made ahead of Columbus Day 2021, which many people across the USA alternatively celebrate as Indigenous Peoples' Day. 'We are in the presence of the first reference to the American continent, albeit in an embryonic form, in the Mediterranean area,' Chiesa said.



NAKORNCREATE/SHUTTERSTOCK

It took many millions of years for plants to reach the level of complexity exhibited today

Double bloom

■ A Stanford-led study has revealed that rather than evolving gradually over hundreds of millions of years, land plants underwent major diversification in two dramatic bursts, 250 million years apart. The first occurred early in plant history, giving rise to the development of seeds, and the second took place during the diversification of flowering

plants. It was only at this time that plants developed intricate interactions with pollinators 'The most surprising thing is this plateau in complexity after the initial evolution of seeds and then the total change that happened when flowering plants started diversifying,' said lead study author Andrew Leslie, an assistant professor at Stanford.

The long and winding road

■ The human brain isn't optimised to calculate the so-called 'shortest path' when navigating urban environments on foot, researchers at the Massachusetts Institute of Technology have revealed.

Using a dataset of GPS tracks from more than 14,000 people walking around New York, the researchers found that pedestrians choose paths that point most directly toward their destination, even if those routes are longer. Unlike computer algorithms that use stored maps to arrive at the shortest possible route between two points, our brains must construct paths based on familiar points of reference, landmarks and angles – which the researchers refer to as 'vector-based navigation'.

A disappointing voyage

■ Mammals, birds and insects often migrate northwards to breed, timing their arrival with seasonal profusions of food. Large journeys are often made to evade parasites and predators, or to find climatic conditions that suit their breeding needs. Now, researchers from the University of Bath have found that for 25 migratory species – including caribou, shorebirds and monarch butterflies – climate change and other human pressures have reduced these benefits. Many species are still hardwired to continue the dangerous trips each year, even where the benefit no longer outweighs the cost. In many cases, this has led to lower reproductive success and higher rates of morbidity.

Honeycombed wood

■ Wood has many structural applications and we're used to seeing it arrive at building sites in boards or sheets. Perhaps no longer. A team from the University of Maryland has engineered a process that allows hardwood sheets to be manipulated into complex structures, such as honeycombs, which have higher tensile strength. The key is to manipulate the cell walls in the wood by rapidly shrinking and blasting open individual fibres and vessels, first drying them and then quickly 'water shocking' them. This creates a window during which the wood can be manipulated without ripping and tearing the material, potentially allowing constructors to mould it into any shape they desire.

IN BRIEF

CHINA

As COP26 rumbled on in Glasgow, reports of 'zombie' coal power stations (those that were halted in 2017 in a move to restrict coal power, but have since been reopened) were circulating. China has argued that coal must be reduced but that it can't be done at the expense of energy security.

AFGHANISTAN

In November, Afghanistan announced that it would be launching a four-day polio vaccination campaign under the auspices of the Taliban-run public health ministry. Afghanistan and neighbouring Pakistan are the only two countries in the world where the disease remains endemic. The Taliban had previously banned polio-vaccination teams from operating in parts of the country.

TURKMENISTAN

Officials from Turkmenistan have claimed that there are no cases of Covid-19 in the country, joining a small group of nations claiming the same thing, including North Korea. However, for the first time, the World Health Organization has publicly cast doubt on the claim. '[It] has been spreading worldwide as a pandemic for almost two years now,' said Dr Catherine Smallwood, a WHO senior emergencies officer. 'From the scientific point of view, it's unlikely that the virus is not circulating in Turkmenistan.'

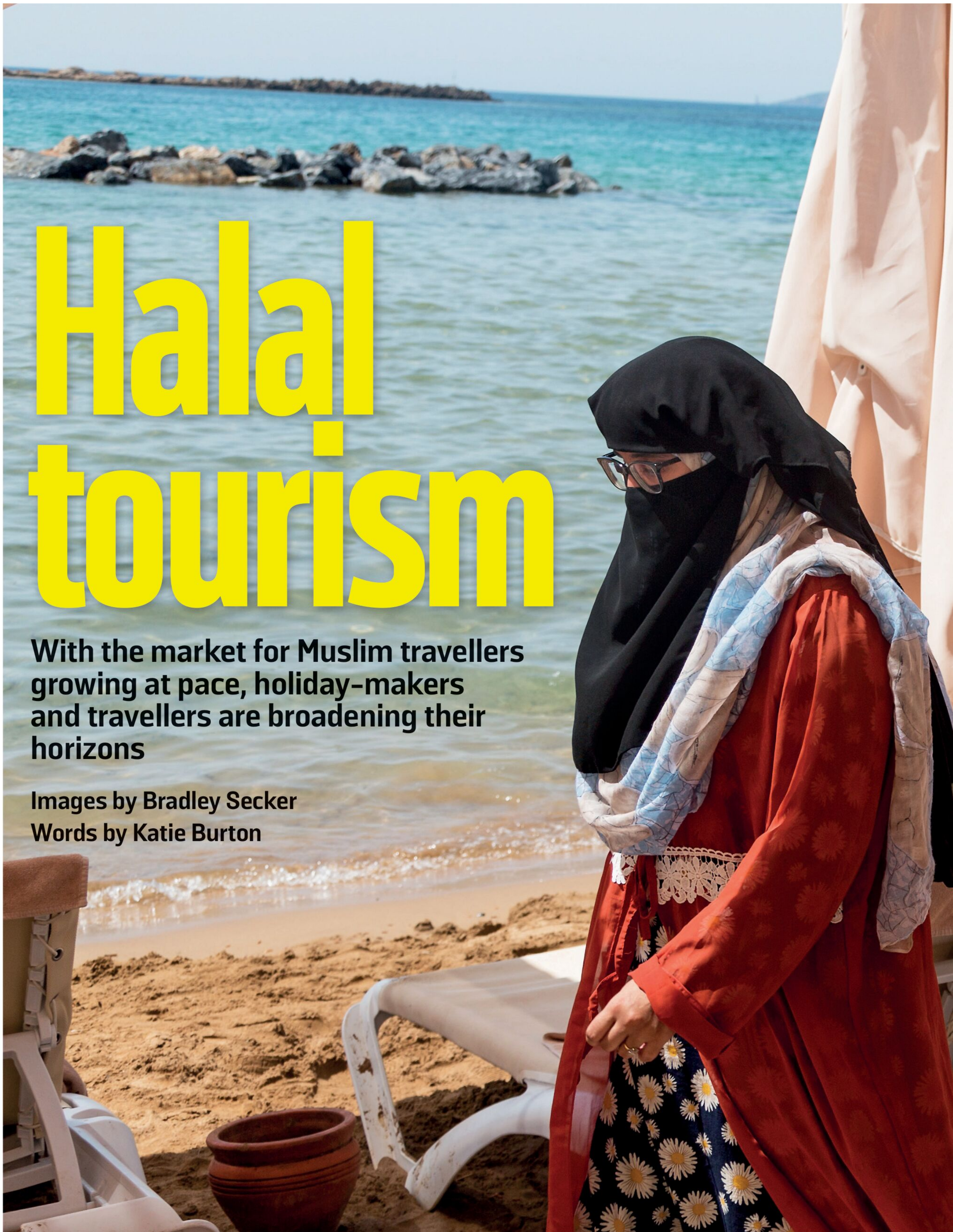
COP26

An analysis conducted by Global Witness has shown that there were more delegates at COP26 associated with the fossil fuel industry than from any single country. The campaign organisation assessed the participant list published by the UN at the beginning of the meeting and found that 503 people with links to fossil fuel interests had been accredited for the climate summit.

Halal tourism

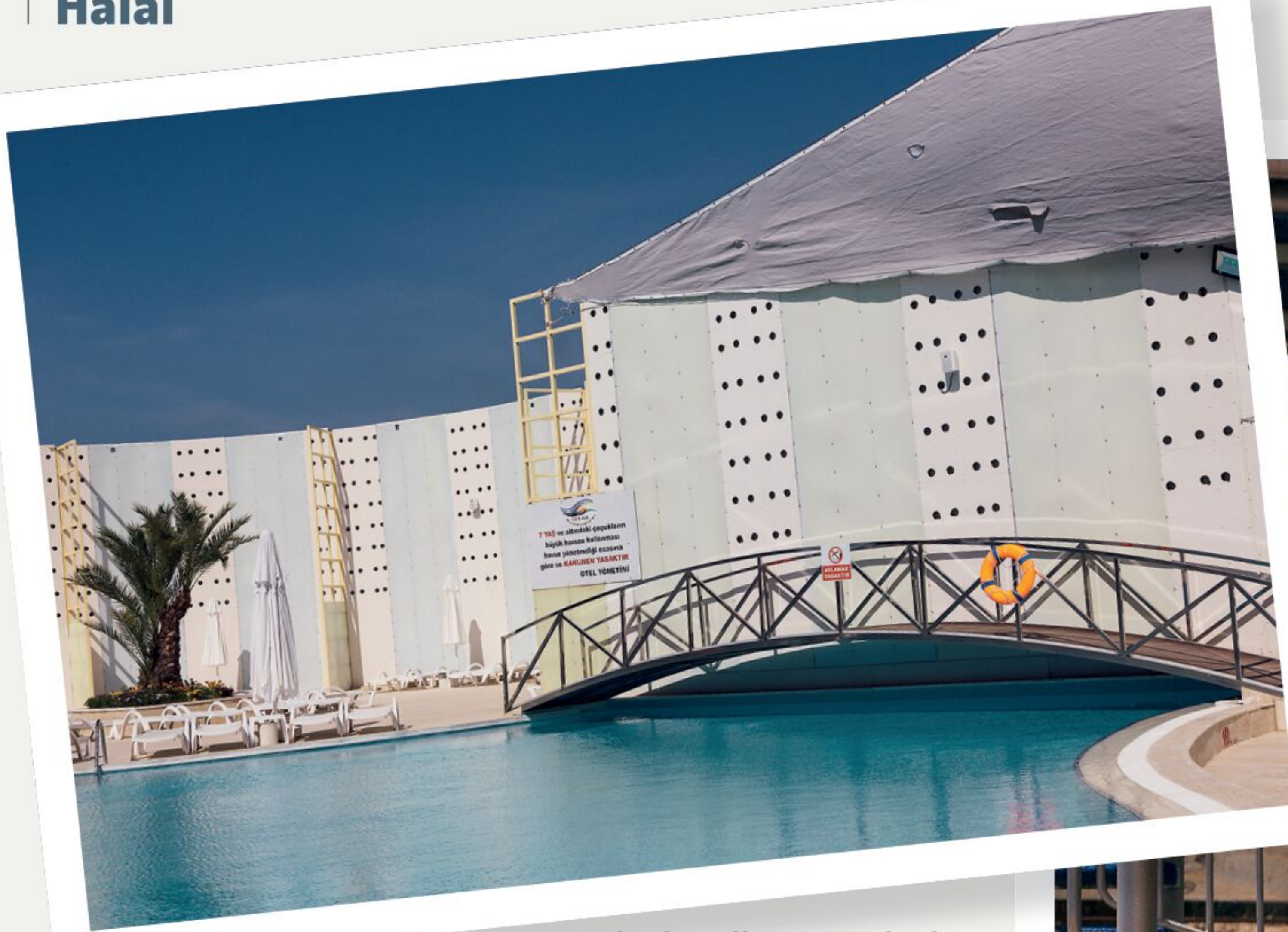
With the market for Muslim travellers growing at pace, holiday-makers and travellers are broadening their horizons

**Images by Bradley Secker
Words by Katie Burton**



A couple from East London with their son at the Wome Deluxe hotel, one of many on Turkey's southern coastline catering to the halal tourism market. The Wome Deluxe opened in 2015





A high wall surrounds the women-only section of the swimming pool at the Selge Beach resort near Alanya

W

hen Istanbul-based photographer Bradley Secker heard about a press-trip to a number of 'halal-friendly' hotels, opened in recent years along Turkey's sunny southern coastline, he was intrigued – both by the idea of halal tourism as a business and by the practicalities of operating such spaces. 'I thought it would be interesting to show how these resorts have developed,' he says. 'A lot of them were changed from resorts centred on Russian or European tourists. They made this quick transition because of the lucrative business potential on the halal side.' It's a process that has involved a number of architectural changes, most strikingly the sail-like divisions erected between male-only and female-only bathing areas. Halal-friendly hotels also cater to other tenets of Islamic belief. Those that Secker visited do not allow alcohol on site, serve only halal meals and offer prayer and mosque facilities.

In photographing these hotels, Secker tapped into a much wider tourism trend, one that goes by many names – halal tourism, Muslim-friendly tourism, to name a few. It is a sector that has grown hugely over the last decade (Covid-19 presenting an obvious blip), moving from niche to mainstream. All-inclusive resorts such as those photographed by Secker are one side of it – appealing largely to families looking for an easy beach holiday with all religious requirements taken care of. But there are many other ways that destinations seek to capitalise on the Muslim pound and it's not hard to understand why.

According to the Global Muslim Travel Index 2021 (GMTI), produced by Mastercard and the research organisation Crescent Rating, international Muslim



traveller arrivals grew from an estimated 108 million in 2013 to 160 million in 2019. With Islam the world's fastest growing and most youthful religion, this trajectory is expected to continue. Within countries that are members of the Organisation of Islamic Cooperation (OIC) – an international grouping founded in 1969, consisting of 57 member states, with a collective population of more than 1.8 billion – the Muslim middle class is growing. Meanwhile, in Western Europe and North America, second and third generation Muslims are entering the workforce in greater numbers with a resultant boost in disposable income. Many countries – whether Islamic or not – are looking to attract these travellers.

THE GROWTH OF A MARKET

Faiza Khan is a marketing lecturer at University College Birmingham who, in 2016, wrote a paper with a colleague titled 'The Halalification of Tourism', particularly concerned with addressing the wide range of terminology used in this space. She explains why this market exists



A man uses the water slide at the Adin Beach hotel in southern Turkey. The hotel is halal friendly and offers gender-segregated areas, no alcohol and modest clothing requirements

'They want to have fun, but within the parameters of their religion'

at all, and why it has been growing. 'If you go back 40 or 50 years, the main focus of many Muslims for travelling would be to go to Saudi Arabia for a religious pilgrimage, or it was to go back to their home countries to see their family and friends. For financial reasons, other travelling would have been a waste of time and resources. But then you get this new, younger generation who may not necessarily want to keep going back to their home countries all the time. They're more exposed to the world, and they want to see more. But they want to do it without compromising on some of their religious values.'

Natasha Ahmed, editor of *British Muslim Magazine*, a lifestyle publication focusing on travel, food and shopping, agrees. 'Even when I was young, my holiday was going to my cousins in Pakistan. And that was the be-all and end-all. But now I've been to Pakistan four or five times since then, and I've explored it for the country, rather than just going to see family and friends. I think a lot of Muslim audiences are now more educated; they have deeper pockets. And they're looking for other things to do. This market doesn't drink alcohol, so they're saving a lot of money and they have started putting their money towards travelling, meeting people, being more educated, more cultural.'

Khan also notes that the September 11th terrorist attacks were a turning point for the industry, one that inadvertently led to new destinations becoming popular with Muslims. 'In some of the richer countries, like Qatar and Saudi Arabia, people would historically have gone to Europe and America, but post September 11th America was very much a no-go zone. There was also a



desire after September 11th to reconnect with heritage and culture. You have countries like Malaysia which tapped into this market very early.'

The GMTI produces a yearly ranking of holiday destinations, distinguishing countries based on a range of criteria, including ease of access and the environment (which includes Muslim travellers' need to feel safe and face few restrictions in practising their faith). In 2021, Malaysia was the top-ranked destination, as it has been ever since the launch of the index in 2015. It was followed by Turkey and Saudi Arabia. Among non-OIC countries, Singapore maintained the top spot, with the UK second. Taiwan, Thailand, Hong Kong, South Africa and Japan were also in the top 10. The report notes that 'these destinations have continued to do some level of passive marketing to the Muslim market even during the pandemic.'

BUILDING CONFIDENCE

Tourist boards have embraced a variety of approaches to appeal to Muslims. In Turkey, easy, all-inclusive offerings have proved popular. Elsewhere, the focus is on culture. The GMTI report singled out Uzbekistan for particular mention, noting that during the last few years it has 'initiated several projects to capitalise on its very rich Islamic heritage to develop what it calls Ziyarah Tourism.'

Gastronomy is another key area, one that particularly appeals to younger, social-media savvy Muslim tourists. The report notes that 'some destinations leading the way for this Halal Gastronomy landscape include Japan, South Korea, Hong Kong and Taiwan.' In fact it is food, more than anything, that unites Muslim travellers. While there are wide differences in preferences and generational gaps when it comes to alcohol, segregation

between the sexes and prayer, most Muslim travellers want to know they can access halal food (which means food that adheres to Islamic law, as defined in the Koran – 'halal' means 'permissible'). 'It's one common factor – people have to eat,' says Elena Nikolova, the founder of Muslim Travel Girl, a hugely successful travel blog aimed at the millennial market. 'One thing where we are lucky, and I'm hoping in the next ten years we'll find more of this, is that there's plenty of halal options of local delicacies. I would like for more travellers to be able to enjoy those local delicacies in a manner that's okay for them.' Born to Greek and Bulgarian parents, Nikolova started the blog seven years ago, having converted to Islam three years before. Her aim is to give Muslim people the confidence to travel anywhere. 'My target audience is mostly millennials of a similar age to me. They want to have fun, but within the parameters of their religion.'

In general, the sense among those writing about this industry is hugely positive. 'I think a lot of the tourist operators, publishers and the market have merged very nicely into this jigsaw,' says Ahmed, from British Muslim Magazine. 'Before, I think people were keen to try and

'People don't ask me now about safety or security. They're asking me: where can I find halal food?'



Father and son play in the men-only section of the Adenya Hotel and Resort

steer the market, but there were just not many key players. Now there are tour operators fully focusing on Muslim tours and Islamic cultural tours.' Like Nikolova, her goal is to encourage Muslims to travel and feel confident doing so. 'We try our best to offer a service to make it slightly more smooth and easy for Muslim travellers to access food and activities, as well as alcohol-free resorts. People still need to understand that Muslims can really go anywhere and stay anywhere.' She adds that many places, once considered off limits, are now open to the Muslim tourist. 'There was this whole taboo around going to Scotland, Glasgow and the Highlands, because there wasn't any halal food there. Now, there are charity walks, women's groups, men's groups that walk the Highlands, or do Hadrian's Wall, or walks around the Cotswolds.'

A CHANGING LANDSCAPE

Destinations haven't always got it right, particularly non-Muslim countries. Michelle Callanan, a tourism lecturer at University College Birmingham (UCB), notes that 'there was a degree of tokenism at the beginning, where

you'd say: "there's a little prayer room over there, off you go". But things have changed markedly.'

It's a change that Muslim travellers have noticed. 'This is just purely anecdotal experience,' says Kahn, also at UCB, 'but over the years when I've been to Malaysia, or even to Turkey, I have seen how in the early days, around the year 2000, people were not always open to having Muslim tourists swimming in pools, wearing burkini-type clothes [a swimming costume that covers the body and head]. And that's completely changed – completely changed over the years.'

'Seven years ago, people were still asking me: "is it okay for me to go through airport security as a hijabi?"' [a woman who wears the Islamic head-scarf], remembers Nikolova. 'But now I see a difference when I go to places like Greece, or Bulgaria. Five years ago, when there were not many Muslims exploring, they would have asked me rudely to remove my hijab. Now, they just point me to a side room.' The questions her readers ask have totally changed too. 'People don't ask me now about safety or security. They're asking: "where can I find halal food? What things can I see, what

mosques can I pray at?” That’s what I mean by confident Muslim travellers. From when we started seven years ago, we see a difference – these people have matured as travellers themselves.’

That said, finding a destination where Islamic clothing is tolerated and accepted is still a selling point for some people. For the Europeans Secker met in Turkey, holidaying in a safe space was certainly part of the appeal. ‘That’s what all the people I interviewed said – “we’re happy to go on regular package holidays in Turkey but if the woman is wearing the burkini there’s often an issue of staring from the regular public.” And they don’t want an alcohol vibe – those drunken Brits milling about.’

He noticed this attitude particularly among tourists from France, a direct response to the move by three local municipalities in the country to ban the burkini from public pools and beaches. The issue received a lot of attention in the press a few years ago, but even in July of this year EuroNews reported that several female activists were fined for wearing burkinis in a Grenoble swimming pool. ‘Five women entered the city pool to bathe on Wednesday, causing the pool to be evacuated at the request of officials,’ read the article. The ban doesn’t extend to the whole country, but as Callanan suggests: ‘It implies that the whole of France is like this. It builds up a negative narrative for Muslim travellers.’

It seems foolish not to note that for some people, the whole of idea of Muslim-specific holidays rankles. But

'From when we started seven years ago, we see a difference – these people have matured as travellers themselves'

identify-specific tourism is nothing new, and usually stems from discrimination. LGBT tourism, which, as the story goes, kicked off in 1973 when the first gay-only tour of the Grand Canyon was offered by US-based company He Travel, offers an interesting comparison. Like halal tourism, it rose up both as a result of people within the community promoting it and due to companies keen to capitalise on a new market. Both also exist to some extent because travel for these groups is not always easy or straightforward.

It’s a comparison that Secker was surprised to find himself make. ‘It’s obviously different, but as a gay guy I understand gay cruises and gay tourism. It’s just because you want the freedom to be who you are without being judged and stared at.’ He admits that he approached his photography project with mixed feelings, but that the reality on the ground seemed fairly simple. ‘I thought: is this another sort of identity politics, segregating people, dividing this, dividing that? But it’s not harming them and it’s the same sort of premise as gay tourism, or lesbian tourism. It’s just catering to one market and making them feel comfortable and at ease when they go on holiday.’

As Faiza adds: ‘They want to explore the world, but is the world welcoming to them?’ ●



Muhammed (centre) from Bradford, UK, plays with his children at the mixed-gender beach of the Wome Deluxe hotel in Alanya



BACK WITH A FLOURISH

A consultation is underway to officially return beavers at the national level across Britain. In our tightly managed landscape, conservationists hope that the species will revive nature's intrinsic messiness for the benefit of all

Words and images by Jacob Dykes



The Eurasian beaver was once common across the UK, but years of hunting for its pelt and other substances led to its local extinction. Now, it is returning. Here, a beaver and her cub rest in a stream at Cabilla, Cornwall

A constant, calming murmur of water follows us through the wood. All around, the white tendrils of old man's beard lichen, thriving in the pure air, grip the branches of ancient sessile oaks. The sound of walking boots is muffled by the soft forest floor, where 1,000 years of non-disturbance has allowed a mesh of mycelial connections to flourish beneath us.

The shallow stream we're following becomes blocked at intervals by felled trees. Merlin Hanbury-Tenison, who inherited the temperate rainforest of Cabilla, Cornwall – one of the UK's last – puts a finger to his lips and points up the stream. There, sitting atop a makeshift structure of broken branches is a revenant, not seen here since a time long forgotten – a beaver. 'To have them back, breeding again in an ancient woodland – the first time in maybe 300 years – is magical,' he whispers with not one, but two, pairs of binoculars at the ready, as if willing himself more eyes to soak in the moment.

RETURN OF THE BEAVER

The campaign has been arduous, but the Eurasian beaver is back. In Scotland, following a trial phase and monitoring of a free-living population that had escaped onto the River Tay from a private collection, beavers were listed by Scottish Natural Heritage as a Protected Species in May 2019. In England, there are a number of enclosed beaver trials and now free-living populations established on the rivers Otter, Tamar, Wye, Avon and Stour. Following the success of the River Otter Beaver Trial – which published its results last year – the UK government announced that the River Otter beavers could remain wild, and now a consultation process is underway regarding a national release and management programme. Scotland has a population of around 1,000 beavers; England about 500. English beavers will be given protected status in 2022, making it illegal to kill them or interfere with their habitats.

With what he calls the Thousand-Year Project underway, Hanbury-Tenison has been captivated by the return of beavers to Britain's riparian woodlands and waterways. His goal is to treble the 40 hectares of this remaining temperate rainforest and to reintroduce native species that were driven from it. Three years ago, he began exploring options with Natural England and the Wildlife Trust to undergo controlled releases of beavers into his woodland. After receiving a grant for the fencing from Tevi – an EU-funded environmental scheme – and receiving a non-native animal keepers licence, he released a male and a female into a woodland enclosure in July last year.

The reason for the enclosure is that beavers are designated a *formerly* native species, at least until the

consultation process yields a complete strategy for reintroduction and management. Britain has been missing the Eurasian beaver since around the late 1700s. The last record of a beaver on British land can be found at Bolton Percy, near York, where a church warden's account from 1789 records 'twopence' being paid to a Mr John Swail for 'a beaver head'. Back then, castoreum, rich in salicylic acid and produced in the beaver's scent glands, was a coveted commodity. Combined with our predilection for their fur, it proved terminal for the UK's population.

We sit for a while in the dark wood, under a cerulean blanket of early morning's first light. Birdsong breaks the silence; to me, the calls blend into one, but they are distinct to the ecologists around me, whose ears are better attuned to their symphony. Hanbury-Tenison reorientates himself to a vantage point on the river bank. From his pocket, he produces a thermal imaging

SOKOLOV ALEXEY/SHUTTERSTOCK



'Over time, their dams and the trees they fell extend river water out onto naturally created wetlands and floodplains'

scope and trains it on the dam ahead. 'Two beaver kits – that's fantastic,' he says, handing me the scope. Through the lens, the dark woodland becomes a grey otherworld, then two tiny, glowing red faces emerge from the tangle of deadwood.

Up until the 1960s, the land surrounding us at Cabilla was devoted to upland hill farming, producing dairy, beef, sheep, pigs, chickens and a variety of crops. 'In the last 60 years,' Hanbury-Tenison explains, 'the farm has been channelled down a path toward monocultures. That degraded the health of the land and soil to the point where it was hard to even sustain the business.' Now, Cabilla has diversified into ecosystem restoration, with education and hospitality forming a new business model. 'She doesn't know it yet, but my nine-month-old daughter will inherit this project, and her children after her,' says Hanbury-Tenison, as the beavers and their kits scurry into dens at the waters' edge.



James Wallace, chief executive of Beaver Trust, stands in a beaver-engineered wetland

ECOSYSTEM ENGINEERS

The real motivation behind this project stems from the idea that forest habitats like this one in Cornwall are incomplete without beavers. These small, semi-aquatic rodents are true ecosystem engineers. For shelter, they build lodges using foraged sticks, vegetation and mud, and they burrow into soft banks and dig networks of canals to provide access to wooded areas for feeding. The dams they build raise and stabilise water levels, providing access to resources and safety from predators. Over time, their dams and the trees they fell extend river water out onto naturally created wetlands and floodplains. ‘The end result is a net increase in habitat heterogeneity – the bedrock of biodiversity,’ says James Wallace, CEO of the Beaver Trust. ‘They breathe life into waterways and woodlands.’

Hanbury-Tenison pauses at a stripped oak branch. New shoots burst from its wound. ‘A beaver breakfast bar,’ he says. ‘It was only by observing beavers that

early foresters learned how to coppice. Beavers are better managers of the wood than we.’ Coppicing is the technique long used by foresters in which trees are repeatedly cut at the base to prolong their life and promote new growth. Around our feet, hundreds of oak saplings rise from the soil, springing forth in pools of sunlight. ‘This regrowth is all because just two beavers have helped to clear the canopy. For ecosystems to function, the pieces have to be back in place.’

Last year, Cabilla experienced an oak ‘masting year’ – an ancient mechanism of reproduction where communities of oaks simultaneously drop a horde of acorns to the forest floor. Botanists believe the phenomenon evolved to sporadically flood the forest with saplings, providing deer with more food than they could eat, thus increasing the number of saplings that survive into adulthood. Beavers would also have played a part in this. By clearing the canopy, they would

have enabled sunlight to reach the forest floor, helping those saplings to grow more rapidly. Meanwhile, their coppicing activity would have sprouted new forage for the deer, also giving the saplings a better chance.

Today, however, beavers may not recognise the land to which they are returning. During the 19th century, technological innovations in agriculture transformed seasonally flooded marsh and pasture into the agronomically productive farmland we see today. After the Second World War, the Ministry of Agriculture, Fisheries and Food began issuing grants to farmers for draining wetlands. An estimated 300,000 hectares of lowland wet grasslands were converted between 1970 and 1985, and 1.5 million hectares of upland peatland was drained in the mid-century, mainly through the mechanical digging of channels designed to lower the water table. According to official records, a million hectares was drained during the 1970s alone. The trend has continued, with land-cover maps showing that between 2006 and 2012, more than 1,000 hectares of natural wetland was converted to artificial surfaces.

In the UK, the AMBER project has found that 99 per cent of our rivers are fragmented by artificial barriers such as dams, weirs and culverts. Many have important functions, but on average, a barrier punctuates every 1.5-kilometre stretch of river. 'Everywhere you look, there's water management; the imposition of culverts and drains that transport water unnecessarily rapidly, and of course, more polluted than it would ordinarily be,' says Richard Brazier, professor of earth surface processes at the University of Exeter and chief scientist on the River Otter Beaver Trial. According to the Water Framework Directive, just 14 per cent of UK rivers are today in 'Good' ecological health; none of the UK's rivers pass 'Good' chemical health standards. More than two-thirds of our groundwater bodies are in poor health due to over-abstraction, and agricultural run-off now pollutes more than 2,296 rivers, leading to nearly two-thirds becoming what the Water Framework Directive dubs 'ecological failures'.

All of this activity has decreased the availability of habitat for plants and animals. Since 1970, there has been a 14 per cent decline in species abundance in the UK on average. More species show strong or moderate decreases in abundance (41 per cent) than show increases (26 per cent) since 1970 – during which time annual agricultural productivity has increased by more than 150 per cent. 'Our obsession with order and control has been to the detriment of biodiversity,' says Wallace.

And yet, trials show that nature can bounce back. It's obvious to see in this undisturbed ancient wood, where the river is now managed by a pair of beavers; where lungwort and barnacle lichens flourish on every square centimetre of the tree trunks; and where, as dawn broke this morning, a green woodpecker flitted in gleeful acrobatics between hazel branches on either side of the riverbank. Such rich fragments of habitat, teeming with new life, are a vision of what nature in Britain might be like. What's more, they could have positive impacts for each and every one of us.

HANDING OVER THE REINS

'I think you will find this habitat particularly fascinating,' says restorative farmer Chris Jones, with the warm glow

of a naturalist in nature, as he guides us through a boggy marsh near the village of Ladock in Cornwall. In 2012–13, Ladock experienced severe flash flooding, but the Environment Agency had no budget to spend on flood defences. At the time, Jones suggested that he release beavers into an upstream enclosure to redistribute water onto the land. In 2017, after he had received a non-native animal licence, Jones's beavers began work on their first dam. Now, four years into what he calls the Cornwall Beaver Project, the same individuals have extended the system to eight dams.

As he leads us down to the beavers at Woodland Valley Farm, my eye traces the network of pools threading the wetland. The river's surface fans outward, the weight of its flow easing as it passes a meshed system of dams. Grasses and reedbeds line the wetland's edges. 'You wouldn't believe it, but these same dams that you're



Old man's beard lichen is an indicator of air quality as it grows only in the purest environments

looking at now provided huge flood defence when Storm Dennis came,' says Jones. Wellington boots squelching through the water, he plunges his walking stick into a thick slop of sediment. 'All of this is the nitrates, phosphates and other agricultural runoff that isn't able to get downstream because of the beavers' work.' Given that these substances can cause huge damage to waterways, contributing to deoxygenation and pesticide pollution, it's significant work.

In 2019, a study that examined the effect of Jones's beavers, along with three other groups in the Forest of Dean, Budleigh Brook and Cropton Forest, was released. It showed that by building dams, beavers reduced average flood flows from extreme-weather events by 60 per cent. An earlier study on the River Tamar showed that beavers reduced the total discharge of water onto inhabited areas downstream, purifying the agricultural runoff. When water had passed through the system of 13 dams that the beavers created, there was three times less sediment, nitrogen levels were reduced two-fold, and phosphate four-fold.

Government bodies have described the results of such studies as 'astonishing' and are now calling



'This is all the muck – the nitrates, phosphates and other agricultural runoff – that is not getting downstream,' says restorative farmer, Chris Jones, as he inspects a beaver dam

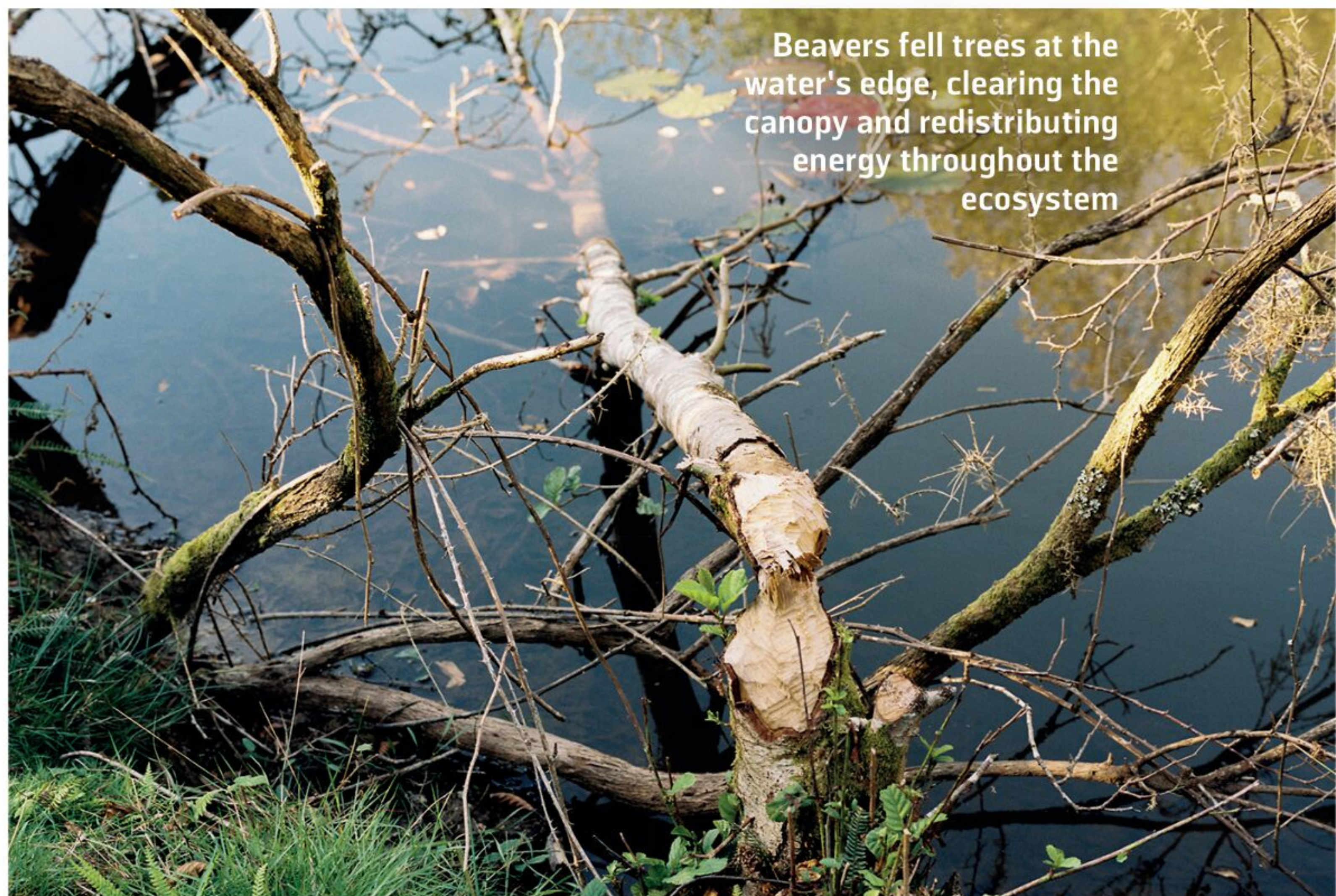
for more 'nature-based solutions' to contemporary land-management problems. But ecologists, having long campaigned for beaver reintroduction, were less surprised. They already knew that beaver dams cause streams to cut into riverbanks, widening the incised channels. As dams trap sediment, the stream bed rises and forces water out onto the floodplain, recharging groundwater. All of this helps to purify the water system, control flooding and help to prevent agricultural runoff from reaching the coast. 'Our problems on waterways, rivers and landscapes have been accelerated by the fact that we haven't had natural functions to counterbalance them,' says Brazier. 'If you think of human jobs since the intensification of farming started as getting water off the land, the beaver's job is to do the opposite.'

This is hugely important given that data from the Met Office, published in the State of Our Rivers 2021 report, show that from the 1990s, as average temperature has risen above 9°C, average rainfall has increased dramatically. Now, across England, 5.2 million homes and businesses are at risk of flooding, and annual average damage costs from floods have risen to more than £1 billion.

For years, conservation groups have pushed to allow more space for natural processes to shape our waterways. A critical hurdle has been unstitching the dependence of farmers on agricultural subsidies, which have historically favoured greater land use, encouraging farmers to extend arable land right to the edge of rivers and incentivising the drainage of wetlands to create more space for crops. Now, the government is developing a new Environmental Land Management scheme to help it deliver the goals set out in its 25 Year Environment Plan. For rivers, there has been a significant breakthrough. Announced on 25 September 2021, the Woodlands for Water project will aim to create 3,150 hectares of woodland in six river catchments from Devon to Cumbria by March 2025, and will make direct payments to farmers for planting woodlands and conserving riparian ecosystems.

Beavers will become a critical aspect of the mission. DEFRA publicly stated in 2020 that beaver reintroductions contribute to the government's 25 Year Environment Plan, and UK prime minister Boris Johnson

recently announced that to help the UK reach net zero by 2050, his government will 'build back beaver'. The UK has already committed to consecrating 30 per cent of the UK's countryside to nature, and the carbon sequestration potential of naturally functioning ecosystems has accelerated the move. A 2018 study found that beaver dams increase the amount of dissolved organic carbon in rivers and riparian woodland; another 2019 study showed that beaver ponds increase the amount of organic



Beavers fell trees at the water's edge, clearing the canopy and redistributing energy throughout the ecosystem

carbon in trapped sediments. 'Where suitable habitats exist currently, it's about getting beavers back into them. Elsewhere, it's about encouraging farmers to step away from the river's edge through payment schemes, allowing regeneration of riparian woodlands, and then we will see beavers' range extend naturally,' says Brazier.

THE FLOURISH THAT FOLLOWS

The afternoon light creeps over Jones's wetland as more signs of the beavers' influence on the ecosystem are unearthed. Grasses elbow their way up from the

AN 'ARK' FOR BRITISH NATURE

● Derek Gow, author of *Bringing Back the Beaver*, was one of the first people in the UK to breed beavers in captivity, with the aim of eventually releasing them. In doing so, he was actively following in the footsteps of another writer and conservationist – Gerald Durrell. In Durrell's 1976 book *The Stationary Ark*, he urged the creation of small, specialised zoos dedicated to breeding 'low-ebb species' that were vulnerable in the wild. Gow answered the call. After consulting with the famed conservationist Roy Dennis, Gow began breeding beavers on his farm in 1995, just in case a nation-wide reintroduction programme ever materialised.

Today, he breeds black storks (which have avoided Britain's depleted landscape since the Middle Ages, but have recently been seen at Knepp Estate in Horsham), thousands of water voles (the population of which has fallen by 97 per cent in this century) and wildcats (once widespread throughout Britain's forests). 'Replacing all of these species is going to be an industrial effort,' he says. 'This is no longer about tweedy naturalists or landowners; it's about everyone.'





Some ancient oaks at Cabilla are around one thousand years old. Merlin Hanbury-Tenison, likens older specimens to 'biological cities', harbouring thousands of species of insects, mosses and lichens

riverbed, water lilies jostle for position and felled trees droop over the riverbanks. Older beaver dams harbour muddy pools behind them, from which dragonflies burst forth. Above them, the limbs of larger trees have been cleared and sunlight shines through the canopy, falling on the pale pinks of cuckoo flowers and the canary yellows of marsh marigolds at the water's edge.

'It's obvious when you see it, but this is all about creating the messiness that our ecosystems are missing in our now tightly managed environment,' says Wallace. 'Nature like this has become sort of alien in the UK.' He is right: according to WWF, the UK ranks 184th out of 219 countries for the status of its ecosystems.

The UK subscribes to the IUCN's rules on species reintroduction and, according to Brazier, is obliged to actively consider the reintroduction of lost native species. Yet, while celebrating the beaver's return, conservationists are keen to point out that it's the first native mammal to ever be reintroduced. 'We are clearly not sticking to the guidelines,' Brazier says. 'We're not acting on species reintroduction at a governmental level swiftly enough.'

In fact, the founders of the beaver populations on the rivers Tamar and Otter came from clandestine releases – a symptom of public impatience with the bureaucracy that accompanies proposed reintroductions. 'People are taking the power back,' says Brazier. 'I can't endorse that, because the better way would be a politically and environmentally progressive action plan. But in the absence of that, there's been a huge groundswell of support for reintroduction of species such as the beaver, and now pine marten, red squirrel, golden eagle and white-tailed eagle.'

In the years ahead, rowan, alder, hazel and willow saplings will keep springing from the banks of Jones's wetland. Some 37 bird species will feed on the rowan berries, 90 animal species will be supported by the alder, and the endangered kingfisher will nest in the willow's branches. Through a single act of engineering, beavers ignite a cascade of resource distribution that ripples through the ecosystem. Through the creation of pools and wetlands during the River Otter Beaver Trial, beavers increased the biomass of trout by 37 per cent. Devon Wildlife Trust found that 55 species of bryophyte increased in abundance with beavers, along with 26 species of wetland beetle and 41 species of other aquatic invertebrates. 'Since they arrived, we've had seven new species of bird at the farm: hobbies, green sandpiper, water rail, cormorants, fire crest, gadwall, spotted flycatcher. Even these grasses wouldn't flourish without the canopy-clearing activity of the beavers,' says Jones, plonking his hat on the bank and moving to the river's edge. He points towards a glimmer in the shallows. 'You see there? Brown trout. Juveniles. We're seeing so many more: the water is cleaner and the beavers have let sunlight reach the riverbed where the fish can spawn in the growing reeds.'

It's odd to think of the beaver's long, bloody history at the hands of humanity. Odder still, to see them here again, when the health of our rivers has been depleted, and when the case for their reintroduction has been hurried by the threat of man-made climate change. Perhaps at this juncture, the beaver – busy on our waterways again – is a symbol of humility, of transition, where we no longer rely on our own ingenuity, but place more trust in the methods of nature. ●



A Saddhu (Hindu holyman) on the banks of the Ganges in Varanasi

Protecting the Mother Goddess

The Ganges is one of the most polluted rivers on Earth, but such is its religious importance that there are those willing to make enormous sacrifices to see that it's cleaned up

Words and images by Stuart Butler





INDIA Ganges

Crowds gather for the enormous Maha Kumbh Mela festival in 2013. Local police estimate that for the most auspicious day of the festival, 30 million people gathered along the banks of the Ganges in the city of Allahabad

Rowing across the Ganges river towards the bathing ghats in Varanasi



The date is 8 October 2018 and a man lies, unmoving, on a hospital bed. The white bed sheet hides his emaciated frame, but his hollowed-out face and sapling-thin wrists tell the story – he is slowly starving to death.

The end of this man's story is near, but the battle on which he embarked will likely rage for many more years. The man who lies rock still in this Indian hospital bed is called GD Agrawal, or to give him his religious name, Sant Swami Sanand. The reason he's starving to death isn't due to famine or poverty – it's due to choice. GD Agrawal, a former environmental engineer turned religious leader and environmental activist, went on hunger strike in order to draw attention to a cause that he believes is worthy of the ultimate sacrifice. He's protesting the poisoning and destruction of India's Ganges River, the Mother Goddess. The following day, he stops drinking water;

it's day 109 of his fast. This is the third fast upon which he has embarked in order to draw the government's attention to the environmental threats that the Ganges faces – and to spur it into action.

Flowing for just over 2,600 kilometres across northern India, the Ganges is more than just a river. For Hindus, it's the Mother Goddess Ganga herself and a focus of religious devotion for tens of millions of people across the world. It's also a vital source of water and life for more than 40 per cent of India's billion-plus population.

And yet the river is being sullied by the very people who revere her. Every day, around three million litres of sewage is emptied into the Ganges – and only about half of that has undergone any kind of treatment. The river's waters are so dirty that it's considered one of the most polluted waterways in the world. But there's more than just sewage entering this river; waste from tanneries, chemical plants, textile mills, slaughter houses and even hospitals is dumped, untreated, into it. Dams block and alter the river flow throughout its higher reaches. Agriculture sucks out vast quantities of water and uses it to irrigate tens of thousands of fields. Even climate change is out to get the

The river is a vital source of water for more than 40 per cent of India's billion-plus population

Ganges. The monsoon rains are becoming less predictable and shorter in duration, droughts are increasing and the Himalayan glaciers that nurture the highest points are shrinking rapidly. The result is that the river levels are falling quickly.

Even love is killing the river. As the Ganges is a holy place, people come here by the millions to bathe, thereby cleansing themselves of sin. As well as bathing, people make offerings of food and flowers, which are frequently deposited into the water in small cardboard boxes or on bits of plastic. Every day, tens of thousands of flowers are carefully placed into the river in this manner and left to drift downstream. This might seem benign enough, but many of these flowers have been treated with chemicals to keep them bright and fresh for longer. When those flowers enter the water, the chemicals leach out.

Hindus also consider the banks of the Ganges to be one of the most auspicious places to die and be cremated. After cremation, the remains are placed into the river and left to float downstream. Some bodies, such as those of young children, are never even cremated and instead are just wrapped in white cloth and sent on their way. In Varanasi, the holiest city along the banks of the Ganges, it's estimated that 40,000 bodies are cremated every year. Scientists have discovered 'super bacteria' living in the waters that are

Hindus consider the banks of the river to be the most auspicious place to die and be cremated

resistant to most forms of commonly used antibiotics.

For decades, cleaning the Ganges has been a political issue. Many politicians have promised to do something about the state of the river but most have failed to live up to those promises. 'Mother Ganga needs someone to take her out of this dirt,' Indian Prime Minister Narendra Modi declared in 2014, shortly after his first election win, 'and she's chosen me for the job'. Modi, a right-wing Hindu nationalist who is now in his second term as prime minister, pledged US\$3 billion in 2015 to clean the river up within five years. But five years later, critics say that there has been little change and that much of the money allocated to the mission has been lost to corruption and mismanagement. In fact, critics say that under Modi, the river, and India's environmental policy in general, are in worse shape than ever. His premiership has coincided with a marked increase in coal mining and the building of coal-fired power plants, which continue to result in worsening air quality and river pollution.

Nevertheless, GD Agrawal isn't alone in his determination to see the Ganges cleaned up and respected in the way that he believes a Mother Goddess should be. In towns, cities and villages all along the river, and across India and beyond, other people and groups, tired of hollow promises, are working in less dramatic but no less important ways to clean things up.

Take those devotional flowers used in *pujas* (offerings) in temples up and down the length of the river. In the



past, they were just thrown into the water, but today, small grassroots projects such as Help Us Green are tackling the problem. One such project involves turning used devotional flowers from temples into joss sticks, which are then lit at the temples. It might seem like a mere teardrop in this polluted ocean, but the quantities are staggering. Help Us Green is based in the industrial riverside city of Kanpur (which holds the dubious honour of having the world's worst air pollution, according to a 2018 WHO report). The organisation's founder, Karan Rastogi, says that he works with 16 large temples in Kanpur, as well as a number of smaller temples. He adds that since its creation in 2015, Help Us Green has recycled 7,000–8,000 tonnes of chemical-doused flowers and other temple debris that would otherwise have ended up in the Ganges. If scaled up, this could make a huge difference; Rastogi's best guess is that, taking the river as a whole, something in the region of 1,000 tonnes of temple and *puja* flowers end up in the river every day and that for every 100 kilograms of flowers, a kilo of pesticide is used.

Other simple but effective projects are springing up. One, run by the Banaras Cultural Foundation, involves

Night falls over the Ganges while pilgrims continue to make *puja* (offerings) from the river bank



planting Indian almond tree seeds along exposed parts of the riverbank around Varanasi. From his home in the city's heart, the group's founder, Navneet Raman, says that the idea of the project was simply to regenerate degraded parts of the riverbank and to create a habitat that would encourage birds and other wildlife to return. For the most part, he and his small team of volunteers have concentrated on planting seeds and saplings along a one-kilometre stretch of bank on the opposite side of the river from the city's famed bathing ghats (steps leading down to the river). This stretch had suffered so badly from environmental destruction that it had become a virtual desert. Raman now estimates that over the past 20 years, he and his team have planted some 12,000 or more seeds and saplings in the area and that today, when he walks along the bank, he does so in the shade of trees, listening to birds warble. An additional effect of the tree planting scheme is that the roots of the trees help to bind the soil and hold the banks in place during the powerful monsoon floods.

Away from the riverbank, Varanasi faces several problems. In this holy city, humanity exists at its most intense. The noise is unceasing, the traffic rages day and night, and

pollution sits heavy over the streets. At first, it feels as if there isn't a single living tree in the city, but Raman and his team have focused their attentions here, too. A 2,500-square-metre patch of forest now sits in the city centre, growing in a spot that, 15 years ago, was wasteland used by mechanics. Today, dozens of birds call the forest home. Raman says that when he visits, he feels as if he's no longer in the city.

Yet more groups are working to tackle the huge quantities of plastic waste that pour out of the mouth of the Ganges and into the Bay of Bengal. Renewology has been installing mobile plastic-waste-to-energy systems along tributaries of the Ganges with the aim of collecting discarded plastic and converting it into fuel. Others are busy installing physical barriers, similar to fences, a short way out into the river to trap waste and prevent it flowing downstream. At the same time, numerous educational programmes teach riverside residents the value of keeping the great river clean.

Ancient religious traditions, too, are being given a green make-over. In recent years, electric crematoria have been constructed next to the ghats in Varanasi and in other holy riverside towns as an alternative to burning the bodies of the deceased on traditional wooden pyres. This helps to

reduce river pollution while also reducing the number of trees that need to be chopped down for the funeral pyres.

These are all worthy projects and worth highlighting, but given the scale of the issue, they can still feel futile, even to those pursuing them. Raman from the Banaras Cultural Foundation sighs when asked whether the Ganges will be a cleaner, healthier river in 20 years' time. 'Unfortunately, a dirty Ganges is worth more to India than a clean Ganges. There are so many big projects to clean up the Ganges – World Bank projects, Asian Development Bank projects, big government projects. All of those projects are posting 20 or so people here, 20 or so people there. They all have fancy cars and get well paid. These projects have so much money. A dirty Ganges generates money for the country through all the development projects. If the river was clean, then the projects wouldn't be needed and the money would disappear. With a clean Ganges, it's only the poor people, who are completely dependent on the river for their livelihood, who would benefit. So, for the bigger people, a dirty Ganges is a money-making machine.'

Rastogi from Help Us Green is less cynical. 'In some ways, things will be better,' he says. 'People are becoming more conscious of what we're doing to the river and the next generation is less interested in going to temples and doing *puja*, so there will be less religious pollution. But, at the same time, the human population is continuing to

In recent years, electric crematoria have been constructed next to the bathing ghats in Varanasi and other holy riverside towns

expand and this will put great pressure on the Ganges. Maybe an even bigger problem is climate change. I think that in the future, the river will be narrower and smaller than it is today.'

During the 16th century, the Mogul emperor Akbar the Great, who at the time was one of the most powerful men on Earth and who did much to turn India into the multicultural society that it remains, served water from the Ganges as drinking water in his court. To him, it represented the 'water of immortality'. Perhaps, one day, it will once again be clean enough to drink. Sadly, however, GD Agrawal won't be around to see it happen. On 11 October 2018, two days after he stopped taking water, he closed his eyes for the final time. For the Mother Goddess he had paid the ultimate price. ●





Every day, tens of thousands of offerings such as this are made to the Ganges. The rubbish left over is causing serious pollution issues

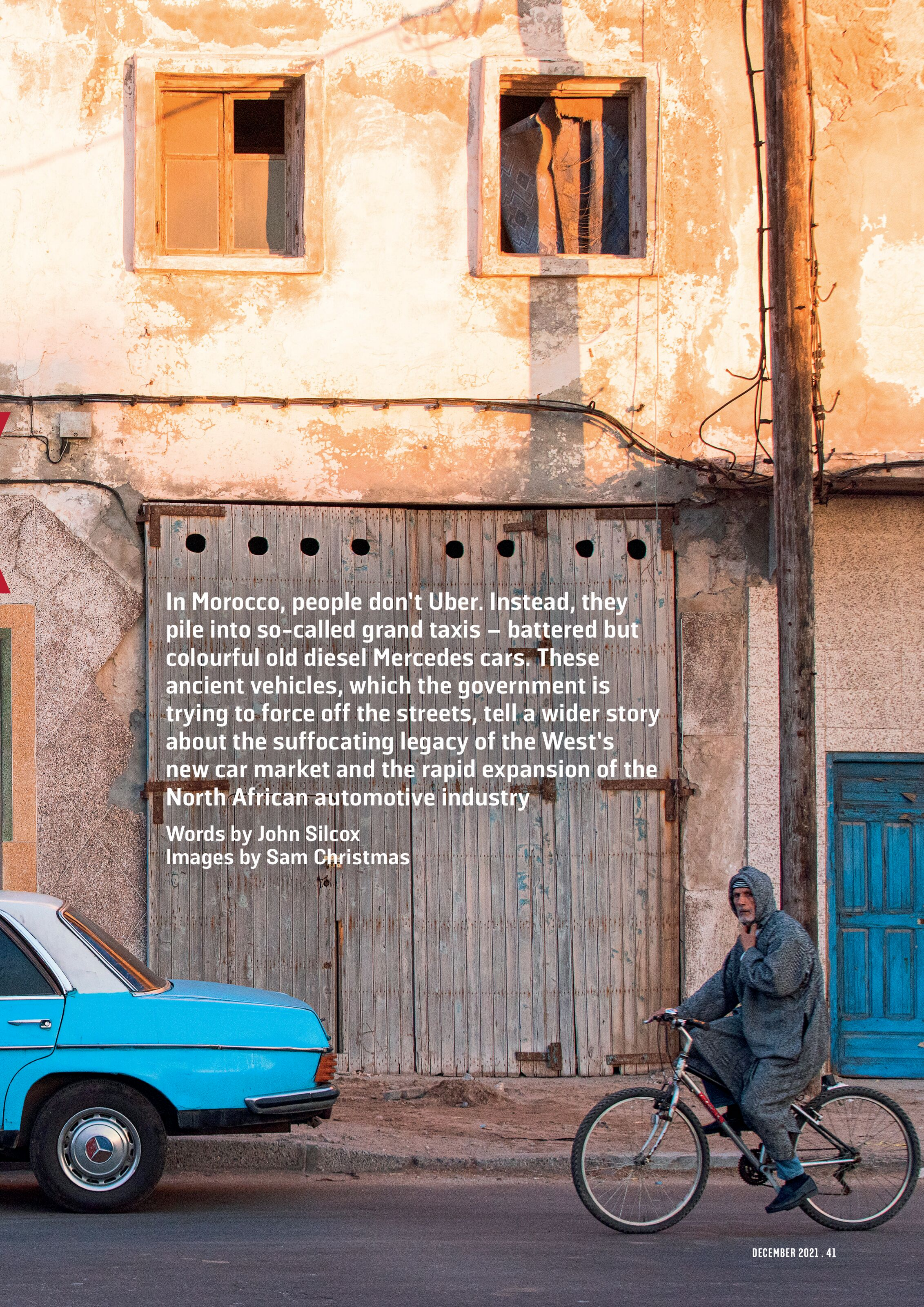


Women take a dip in the waters of the Ganges. Bathing in the river is said to cleanse the soul

MOROCCO
Taxis

Merci dix

In Morocco, the grand taxis used to ferry people long distances are painted a region-specific colour. In Essaouira, they are all bright blue



In Morocco, people don't Uber. Instead, they pile into so-called grand taxis – battered but colourful old diesel Mercedes cars. These ancient vehicles, which the government is trying to force off the streets, tell a wider story about the suffocating legacy of the West's new car market and the rapid expansion of the North African automotive industry

Words by John Silcox
Images by Sam Christmas

MOROCCO

Taxis



The sun is still hiding behind weathered stone ramparts high above the old Moroccan port of Essaouira, but already, day-to-day business is well underway at the small city's bustling Place des Grand Taxis. Drivers are demisting cracked windscreens with filthy wads of old newspaper while oil-covered mechanics attempt to coax weary engines back to life amid clouds of thick, blue smoke. Long-distance travellers are huddled together, waiting in small groups for a ride, their faces concealed from the cold by hooded woollen robes or *djellabas*.

Everyone is eager to get on the road early and escape the unrelenting heat of the day, which makes sitting in a cramped vehicle – with up to five other passengers, their luggage and driver – unbearable. So most eyes track the chief broker, who busily manages operations from a prominent position next to the entrance of the whitewashed compound, where a fleet of 30-odd sky-blue cars are parked. At regular intervals, he barks orders at both drivers and passengers, skilfully orchestrating proceedings using a rectangular piece of card on which he scores a long list of numbers, controlling every vehicle that comes in and out of this organised chaos.

Just before 8am, a particularly old taxi appears from behind a veil of dust, bouncing off the pot-holed road and mounting the low kerb that leads to the transport hub. After nonchalantly avoiding collision with an orange vendor's cart and a skinny stray dog, the car crawls past the broker and finds a space at the back of the rank. Behind the wheel sits Hassan Mesfar, a well-known and much-loved character in the neighbourhood, who is instantly recognisable by the car he drives: a 1974 Mercedes 'Stroke 8'. In the UK, such a vehicle would belong to a motor museum, but in Morocco,



Hassan Mesfar, a well-known and much-loved character in the neighbourhood at wheel of his taxi

it's just another rolling ruin. Still, this one boasts the dubious honour of being the oldest taxi in Essaouira – although not by much. It shares the tarmac with plenty of other battered and bruised diesel vehicles, all of them long due retirement.

In this city, as all over the kingdom, many Mercedes 240Ds from the 1970s and '80s have spent their twilight years in the sun, having been shipped over when they were deemed too old for the European market. Here they're woven into the fabric of society, providing an essential long-distance travel link for locals, as well as a colourful snapshot for tourists, much like the old US cars in Cuba. But not for much longer. The Moroccan government is keen to remove them from the country's roads. In 2014, it launched an incentive scheme that offers grand taxi drivers 80,000 dirhams (around £6,500) to scrap their old vehicles. So far, more than 56 per cent



A particularly old taxi appears from behind a veil of dust, bouncing off the pot-holed road and mounting the low kerb

of the 45,000 grand taxis in service have been updated thanks to this programme – something the government aims to increase to 100 per cent by 2022.

‘It’s the end of an era,’ says Mesfar ruefully as he sits down to enjoy a coffee at his regular spot. Last night, he was late getting back from his journey and as is customary with the grand taxis’ first-in first-out

system, he won’t be leaving until later in the day. ‘The government is offering us money to update our cars for shiny new Dacias, but for me, they’re not the same as my old Mercedes. It’s the best car I have ever driven – so solid, so reliable, so comfortable – and never lets me down. That’s why around here we call them “*Merci dix*”’. In Moroccan French, this phrase literally translates as ‘thanks times ten’, but there’s also a play on words with the local pronunciation of Mercedes.

Hassan, who, like many taxi drivers, is a theatrical conversationalist, says the phrase by pursing his lips, lifting his chin and narrowing his dark eyes as if squinting into bright light. He then draws out the ‘r’ by pulling his face back into a grin, rattling through the other syllables and pushing out the final ‘s’ through near-closed teeth. All the while, jiggling his head and raising his hands in mock praise. It’s quite a performance.

Grand taxis are often in fairly bad shape, patched-up over many years and by many owners



LE GRAND TAXI

To understand the impact of the new scheme on a national scale, it's important to understand the wider role of taxis in Morocco. In a country of 36 million people, there are only 2.8 million registered cars: so only one car per 11 Moroccans. Nearby Spain, with a population of roughly ten million more, has more than 24 million vehicles on the road. Without rail or buses to provide a well-developed or affordable solution to the masses, grand taxis are the leading long-distance transport solution.

'*Le grand taxi* is the backbone of Morocco,' says Mesfar, proudly emphasising the essential role that he and his co-workers deliver. 'Public transportation is next to nonexistent; there is only one train line and that's up north. If you want to get to another city, you can take the bus, but departures are irregular, there are frequent accidents, it's very slow and it only takes you to the big cities. That's why people like to take grand taxis – because they're nice and quick.'

The Place des Grand Taxis is much more than a simple taxi rank – it's a main transport hub and each city in the country has one. Here in Essaouira, under the watchful eye of the chief broker, travellers on their way to a particular city up north are ushered into one taxi, those going south into another and so forth. Then, when all of the seats in a car have been taken, it can leave on its journey. Generally speaking, the more distant the destination, the earlier the departure. Most drivers prefer to return to their home base each night, despite the fact that they may have to travel upwards of 1,000 kilometres per day, although this isn't always possible.

'Look at the green taxi parked over there,' says Mesfar. 'That's stayed overnight from Taroudant [a city to the

'When things break, people always find a way to fix them. Moroccan taxi drivers have many tricks up their sleeves'

west of Essaouira]. And that one over there is from Rabat as it's white. Each city in Morocco has its own taxi colour scheme, which makes it easy to spot.'

Essaouira boasts a unique shade of blue that originally came from crushed seashells. Nearly everything in the city has been painted with it: from horse-drawn carriages to people's front doors – even the petit taxis. This last point is unusual, as most other Moroccan cities chose different colours to differentiate petit taxis, which are smaller cars (usually French hatchbacks), only allowed to take a maximum of two passengers on much shorter rides within the urban perimeter.

AFRICA: THE WORLD'S SCRAPYARD

The love affair between Mercedes – the German automotive brand – and the North African kingdom dates back to the earliest days of the automobile. In 1892, Sultan Hassan I bought the first car ever made by Daimler (the company that owns Mercedes-Benz) and this royal endorsement has continued ever since. The current king, Mohammed VI, still uses a unique Mercedes Benz 600, passed down from his father, for state functions.



A street dedicated to taxi repairs, an example of the 'hotbed of mechanical resourcefulness' that people say characterises the whole continent

'During the 1980s, Africa started to experience an influx of second-hand Mercedes cars,' says Flavien Neuvi, an economist who specialises in the African automotive industry. 'Moroccan taxi drivers simply started catching on to what cab owners in Europe had understood: diesel Mercedes were built to last.'

Mesfar's Mercedes W114 'Stroke 8' model was a game-changer for the Stuttgart-based manufacturer and 1.9 million rolled off the line during its eight years of production. Its successor, the W123, appeared in 1976 and even more were produced; 2.9 million of the cars were built in the nine years that followed.

Back in the 1970s and '80s the average age of cars in Europe was less than seven years. The relatively quick turnover meant that millions of robust and reliable Mercedes were being swapped for newer cars by their original owners and sold on the used-car market. Eventually, when they were deemed too old for European buyers, they were picked up at a discount by exporters and shipped off to the developing world, with Africa being the favourite destination.

In 2000, more than 70 per cent of all cars imported into Morocco were more than five years old, including many old Mercedes, which have enjoyed incredible

longevity thanks to their robust mechanics, simple maintenance requirements and an abundance of salvaged spare parts. It was estimated that 35,000 W123 240Ds alone were still on Moroccan roads in 2011, more than 30 years after the last of the model rolled off the production line.

‘Africa is a hotbed of mechanical resourcefulness,’ says Neuvy. ‘Everything has a value, even if we would deem it rubbish in Europe. When things break, people always find a way to fix them. So Moroccan taxi drivers have many tricks up their sleeves to keep their vehicles on the road.’ One popular stratagem involves filling the car’s

hideous pollution problems in their cities,’ says Mike Berners-Lee, a leading expert in carbon footprinting. ‘With old diesel engines, there are two types of pollution: the type of pollution that clogs up your lungs and kills you and passersby with particulates; and then there’s carbon emissions, which affect climate change. In the UK alone, 40,000 people per year die of this first kind of pollution, so it’s definitely something that needs to be taken seriously.’

The Moroccan government’s response has been to implement a series of measures. In 2010, it banned the import of all cars more than five years old and increased tax duties on the sale of second-hand vehicles. Then, in 2014, it brought in the first cash-incentive scheme aimed at grand taxi drivers.

So far, the scheme hasn’t quite had the desired reach, with poor levels of uptake at its launch and multiple deadline extensions for ambitious targets ever since. Critics also point out that the government has other motivations for subsidising new car purchases, namely the fact that in recent years, the country has invested heavily in developing its own automobile production facilities. The North African kingdom is set to become one of the world’s big players in the automotive sector, with its vehicle-production industry poised to be worth about US\$14 billion within the next five years. As of 2019, the automotive sector represented nearly 30 per cent of the country’s exports and already, one in five new car imports into Europe comes from Morocco.

French manufacturer Renault has historical links with the territory and benefits from support by the Moroccan government. It operates two plants in the north of the country. Production at these sites includes the seven-seater Dacia Lodgy, which is now the most commonly bought taxi in the country, representing one in every two new sales.

This sounds like a positive movement, given the heavy pollution associated with old diesel vehicles; however, according to Berners-Lee, it isn’t quite so simple. ‘From an embodied-carbon perspective, keeping these old Mercedes on the road is actually better than replacing them with new ones,’ he argues. ‘People often forget that producing new vehicles generates a lot of unseen carbon emissions, even though the end product spits out less from its tailpipe. So it’s important that we learn a lesson here about our attitude to new, efficient vehicles. The direct savings from the previous model must be significant enough to warrant renewal, otherwise we’re simply offsetting the problem to a different part of the vehicle’s life-cycle.’

There’s a balance to be had, but regardless of how it plays out, back in Essaouira it’s going to take more than a few thousand dirhams and a shiny new car to make Hasan Mesfar change his ways. ‘I’m too old for anything new anyways,’ he says. ‘I’ll be retiring in a few years, so it would be a waste of money to upgrade. I also don’t think my customers would like it. And for me, it wouldn’t be the same job without my Mercedes. We’ve travelled so far, experienced so much and been on unforgettable adventures. It’s only fair that we reach the end of the road together.’ ●



The chief broker keeps a note of comings and goings

The North African kingdom is set to become one of the world's big players in the automotive sector

boot with large stones in order to limp home after breaking a prop shaft. The additional weight on the rear axle stabilises things, allowing the driver to keep the car on the road.

CLEARING THE AIR

The downside of the Mercedes’ longevity is that while European drivers have enjoyed numerous generations of cleaner, more efficient vehicles, Moroccans have been suffering from increasingly bad air pollution. According to the Barcelona Institute for Global Health, mortality due to air pollution in the country has increased by 50 per cent since 1997. Vehicle emissions are the most significant source of air pollution in Moroccan urban centres, accounting for nearly 60 per cent of the total.

‘Some developing countries have some pretty



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Scaling the heights

The highest mountains on Earth are known as the 8,000s (the 14 mountains that rise more than 8,000 metres above sea level). They are all situated in the Himalayan and Karakoram mountain ranges. Many attempt to reach these heights, but doing so is risky. Here, we show the ten highest mountains on Earth, with data on successful summits and deaths as a result of the attempt. On Mount Everest alone deaths have occurred every year since 1978, excluding 2020 when permits were not issued due to the Covid-19 pandemic.

Data from the Himalayan database, Elizabeth Hawley

Design: Geoff Dahl

Mount Everest:

8,848M

Nepal/Tibet



Ascents: around 5,000
Deaths: 280

HIGHEST ALTITUDE ON
OTHER CONTINENTS

Kilimanjaro:

5,895M

Tanzania



Elbrus:

5,642M

Russia



Vinson Massif:

4,892M

Antarctica



Mount Kosciuszko:

2,228M

Australia



HIGHEST ALTITUDE
IN THE UK

Ben Nevis:

1,345M

Scotland



K2:

8,611M

Pakistan/China



Ascents: 355
Deaths: 82

Kangchenjunga:

8,586M

Nepal/India



Ascents: 446
Deaths: 51

Lhotse:

8,516M

Nepal/Tibet



Ascents: 866
Deaths: 21

Makalu:

8,485M

Nepal/Tibet



Ascents: 568
Deaths: 48

Cho Oyo:

8,188M

Nepal/Tibet



Ascents: 3,903
Deaths: 52

HIGHEST ALTITUDES IN THE WORLD

Annapurna I:

8,091M

Nepal



Ascents: 298
Deaths: 72

Nanga Parbat:

8,126M

Pakistan



Ascents: 339
Deaths: 69

Manaslu:

8,163M

Nepal



Ascents: 2394
Deaths: 86

Dhaulagiri:

8,167M

Nepal



Ascents: 556
Deaths: 85

Aconcagua:

6,962M

Argentina



Denali:

6,194M

Alaska



Mauna Kea:

10,200M

Mount Everest:

8,848M



Below the sea

Mount Everest may have the highest altitude of any mountain (measured in feet above sea level), but it is not the tallest from base to summit. The dormant volcano Mauna Kea, which makes up one of the islands of Hawaii, has an altitude of just 4,207 metres, but measures 10,200 metres high from its base at the bottom of the Pacific Ocean to its peak.

Olympus Mons:

25,000M

Mount Everest:

8,848M



Above the sky

Earth's mountains may be impressive, but they are nothing compared to those on Mars. The volcano Olympus Mons is the highest known mountain in the solar system and stands at 25,000 metres high, with a base diameter of 603 kilometres – enough to cover the entirety of Austria.

Trentino: Saving the wood and the trees

Three years ago, a violent storm devastated northern Italy's iconic forests. [Chris Fitch](#) investigates what makes these trees so special and how people from around the world are helping to bring them back to life

Norway spruce comprise around 85 per cent of Paneveggio forest. Damage to some portions from the 2018 storm are still visible



CHRIS FITCH



- **Population (Trentino):** 541,098 (2019)
- **Capital city:** Trento (pop. 55,000)
- **Land area:** 6,214 square kilometres
- **Highest point:** 3,769 metres (the southern summit of Monte Cevedale)
- **Region:** Trentino and the neighbouring northern province of Alto Adige (also called South Tyrol) make up what's commonly referred to as Trentino-Alto Adige

O

n the evening of 29 October 2018, Paolo Kovatsch was sitting at home in the picturesque town of Cavalese, in the northern Italian province of Trentino. Wind howled in the darkness outside and Paolo's windows were battered by heavy raindrops.

'It's an old house, close to a small river,' he says. 'Normally, when it's raining, you hear the noise of small rocks and stones, but that night, it was a super noise – the whole house was trembling – because the stones were not so small! At that moment, you understand that something big is happening.'

Paolo pauses and sips his espresso. His beard is fluffy and white, accompanied by shoulder-length silvery hair and wild eyebrows. If you were asked to pick a man with 30 years experience working in mountain forests out of a crowd, Paolo is the man your finger would immediately gravitate towards.

'Did you feel scared?'

He takes a second before replying. 'You feel that you can't control anything; you feel a bit powerless. I wasn't scared, but I didn't know what to do. I didn't know what was happening. Nothing is working, it's dark, the clouds were low, so you couldn't see anything. And it was dangerous to go outside. So you are just waiting. But, waiting for what?'

MAKING MUSIC

The Italian province of Trentino – which borders Lombardy, Veneto and the northern province of South Tyrol (also called Alto Adige) – is 56 per cent forest,

Ciro Doliana demonstrates how to turn simple blocks of wood into musical instruments



CHRIS FITCH

comprising an estimated 500 million trees. These forests have a prestigious heritage. Fourteenth century Venetians, in the midst of imperial delirium, headed to the region in search of enormous tree trunks to turn into trading vessels, warships and the foundations necessary for constructing a city across marshy islands.

Some communities willingly handed over the right to have their forests plundered, in exchange for political favours. Others, such as the community of Paneveggio, resisted. Now a 2,793-hectare forest located about 64 kilometres northeast of the regional capital, Trento, Paneveggio remains important to the local economy, producing timber that's strong, sturdy and suitable for construction, all obtained by selective cutting. No deliberate planting is required here; trees are cut in such small numbers that the forest simply replenishes itself naturally.

The wood is melodic, too. For centuries, instrument makers have travelled to Paneveggio in search of Norway spruce, which comprise around 85 per cent of the forest (alongside a mix of larch and both red and white fir). These trees possess the perfect resonating qualities for making string instruments – everything from violins, violas and cellos to guitars and lutes.

Renowned Italian master craftsman Antonio Stradivari famously favoured wood from these forests – there are legends of him wandering among the trees, hunting for the perfect timber for his masterpieces (of the estimated 1,200 instruments Stradivari crafted, about 500 are believed to still be in circulation, one of which sold at auction a decade ago for US\$15.9 million).

The reason why both past masters and contemporary artisans are so drawn to Paneveggio involves multiple factors that influence the quality of the wood in a living tree. The trunk must contain fibres that are dead straight and free of defects such as knots that interrupt these straight lines. It also requires tight, dense inner rings, formed by slow-growing trees. Paneveggio, a cool mountain region between 1,500 and 1,900 metres above sea level provides optimal growing conditions. With such a rich history, Paneveggio has become known as *la foresta dei violini* – the forest of violins.

Of the 4,000 cubic metres of wood retrieved from the carefully controlled tree-cutting process that takes place here every year, less than one per cent is identified as what's known as 'resonance wood' (also 'resonant' or 'resounding' wood) and set aside to become part of a musical instrument. Cutting takes



Wood, specially selected from the very best Norway spruce trees, is broken along natural fractures and stored in wedges, ready for instrument makers to use

CHRIS FITCH

TIMELINE

● 1st century BCE

Romans conquer the region and Trento becomes a Roman city

● 1027

The Holy Roman Emperor gives the area to the Bishopric of Trent, an entity that survives for eight centuries and which grants Trentino some autonomy

● 15th century

Troops from the Republic of Venice enter parts of Trentino but are stopped in the battle of Calliano

● 1801

Most of the region is conquered by Napoleon and becomes part of his Kingdom of Italy

● 1815

The Bishopric of Trent is dissolved and Trento is assigned to the Habsburg Empire

● Early 20th century

Austro-Hungarians strengthen troop levels and fortify the area in anticipation of war

● 1915

Italy enters the First World War and the territory becomes a main front between Italy and Austria-Hungary; it suffers heavy damage

● 1919

Under the Treaty of Saint-Germain-en-Laye, Trentino is united with Italy

● 1996

The Euroregion Tyrol-South Tyrol-Trentino is formed between the Austrian state of Tyrol and the Italian provinces of South Tyrol and Trentino, with the aim of promoting regional peace and cooperation

place in late autumn, when tree growth slows and there's less sap movement to potentially damage the quality of the wood. The last full moon of the year, when the trees are said to be at their most lethargic, yields the most sought-after resonance wood.

This elite wood is then 'broken' along natural fractures into wedge-shaped blocks, before being labelled and dried. These blocks, seemingly unnaturally perfect, straight and smooth, are left in a special storage shed known as a xylotheque, with wooden slats on the windows to allow constant air flow, but no direct sunlight. It will remain here, often for years, awaiting the arrival of sharp-eared perfectionists searching for the ideal material for their instruments.

NOTE PERFECT

In the basement of a picturesque white-and-pink house just off a small square in the town of Tesero, amateur lute maker Ciro Doliana demonstrates how to turn simple blocks of wood into exquisite musical instruments. It's a time-consuming process, he explains, taking roughly 300 hours per instrument.

One side of Ciro's workshop contains an assortment of chisels and hand planes covered in sawdust. The

other side contains gleaming violins and cellos in a glass display cabinet. The whole room is filled with a soft perfume – the scent of white fir, from the resin within one of the varnishes that are carefully and repeatedly applied to the finished instrument over a ten-day period.

Ciro explains that the most important part of a lute (in common with other similar instruments) is the soundboard, the curved surface that vibrates when the strings are plucked, resonating the desired sound into the surrounding air. While other parts of the instrument can be built from a mix of woods – in the case of the one he's currently working on, willow and maple, and decorated using ebony and pear – the soundboard must be made from the highly valued resounding wood. Ciro is extremely particular about the quality required to make this component.

'I want to see the trunk,' he says. 'I know what I'm looking for, from outside the bark.' He describes the characteristics he seeks: north facing, at high altitude, with other healthy trees around, a straight trunk with no leaning or curving and rich, fertile soil. 'But science can't predict everything,' he adds. 'I'm looking for regular growth... then the heart comes in. Then I fall in love.'

STORM VAIA

The final week of October 2018 saw extremely heavy rainfall across northern Italy as a rare cyclone, given the name Vaia, swept over the western Mediterranean. Storm surges occurred in both the Adriatic and Ligurian seas, either side of the Italian peninsula, with Venice recording one of the worst flooding events in its history. Over three days, 850 millimetres of rain fell across Italy's Alpine region, triggering numerous floods and landslides.

On the third night, Paolo Kovatsch was at home, in that old house by the river. As technical manager of the Provincial Agency for State Forests in Trentino, he's responsible for 11,200 hectares of trees spread across nine different state-administered forests, including both Paneveggio and Cadino, the nearest forest to him. It was because of this expertise that many people turned to him with their concerns about the impact of the storm.

'It had already been raining for three days; the rivers were full of water,' he recalls. 'So we were already in a state of emergency. Suddenly, there was a lot of rain, and super-strong wind. Around 8.30pm there was a blackout, no lights.'

Utilising the minimal communication that was possible (mostly radios), Paolo and his colleagues agreed that, despite their worries about the worsening weather, there was nothing they could do that night except hunker down, stay safe and wait for the light to return. When he stepped outside in the morning, Paulo saw the mountains coated in thick, impenetrable fog. Huge numbers of fallen trees, lying strewn across the mountain roads, hinted at significant damage at higher altitudes. However, the debris prevented anyone from driving up to observe the state of the forests. 'You couldn't go there to see,' he says, 'but you could realise that something had changed.'

The blackout lasted for 24 hours. Even then, it took two days of waiting before the lingering low clouds finally cleared and the level of devastation became fully apparent. 'We were all shocked when we saw what had happened,' says Paolo. 'Not one of the people here had experienced anything like this before. It was the first experience like this in their life. The feeling was, "Now what should we do?" You know, where do we start? Because everything is destroyed.'

Thanks to Vaia, four million cubic metres of timber was felled in forests across Trentino, equivalent to eight years of normal cutting. Cadino suffered even worse. A

Fallen trees are stripped down and piled up as part of the clear-up effort



CHRIS FITCH

'The feeling was, "Now what should we do?" You know, where do we start? Because everything is destroyed'

region used to carefully removing 11,000 cubic metres of timber per year saw 200,000 cubic metres downed – equivalent to 18 years of cutting.

At its peak, the channelling of Vaia's strong gales through the tight valleys between the mountains saw wind speeds of more than 200 kilometres per hour recorded – likely the time when the majority of the damage was done.

Trentino had previously seen a large storm in 1966 that caused isolated pockets of damage across the province, but beyond that, there were no recorded incidents of such powerful weather crashing through the landscape in such a devastating way.

STUDYING GLACIERS BEFORE THEY DISAPPEAR

● Trentino's high-altitude glacial environments are warming at twice the rate of the wider world, having added an average of 2°C since the 1970s. Local glaciers have shrunk by an average of 75 per cent since the mid-19th century, leaving the roughly 140 glaciers dotted across the Alpine environment substantially diminished. MUSE, the science museum situated next to the River Adige in the regional capital, Trento, opened in 2013, and concentrates on studying the mountain environments of the Brenta Dolomites in the eastern part of the province, and the 300 million years of history stored within their

sedimentary layers. There's a particular focus on learning more about the impact of warming on local ecosystems. Many mountaintops are becoming more biodiverse, as species fleeing warming temperatures congregate at higher altitudes, but these same species can then become vulnerable to the 'summit trap' phenomenon, with nowhere higher (and cooler) to go. Many niche habitats – such as small pools of meltwater – are home to various plants, fungi and insects that have evolved to survive only in these unique conditions. The loss of these species could potentially cascade throughout the rest of the ecosystem.

As technical manager of the Provincial Agency for State Forests in Trentino, Paolo Kovatsch is responsible for 11,200 hectares of trees



DAMAGE AND REBIRTH

We climb inside Paolo's Dacia and drive through Val di Cadino towards the damaged forests. Wispy clouds hang above the tree-covered mountains, the distant Dolomites ripping through larger passing clouds. 'This is all Vaia,' explains Paolo, pointing through the windscreen towards various scars in high-altitude treelines, prominently visible across the surrounding mountain slopes. They look like bald patches in the fur of an old dog.

Turning onto a thin gravel road, we slow to a stop. A large clearing appears among the trees, where thick shrubs and vegetation no more than a metre high are growing. 'This isn't Vaia, just Storm Paolo,' Paolo jokes.

This is what the forest looks like after the normal cutting process has taken place. After seven years, the vegetation in this spot is in a healthy process of ecological restoration, helped by the close proximity of the surrounding trees, which are naturally repopulating the sun-drenched clearing.

It's very different from the scene that confronts us ten minutes later. As the road turns sharply to the left, the car crunches to a stop. Here we find a huge gap in the trees, many times larger than the clearing we've just left, like a giant fist has punched a hole in the tree-covered mountainside. This is where Vaia left her mark. Even three years later, little more than barren earth – with a few pitiful grasses – fills the space. Aside from a mechanical banging sound that echoes up from distant

Forest guide Girolamo Scarian looks out at the damaged landscape



maintenance, there is utter silence. It feels as if we're standing in an ecological cemetery.

The circle of utter devastation raises some questions. 'These trees, only these,' mutters Paolo, more to himself than to anyone else. 'Why not these?' He waves an arm at the twin walls of trees on both sides of the clearing, standing upright as though the storm never happened. It could be that some species, such as red firs, which have shallower roots, were more vulnerable to the storm, while white firs and larches, which have deeper, carrot-like roots, were better able to withstand the powerful winds.

Our final stop is the summit, where we park in the middle of what was once a thick forest. The road up is only a year or so old, built simply so that the necessary machinery to clear the fallen trees could be transported to the top. After lugging fallen tree after fallen tree up the slopes on thick cables, like a reverse zip line, these machines strip them down to the bare trunk and pile them up. Large trucks navigate the winding roads then carry the timber away for export. Paolo estimates that by the time these final fallen trees have been collected and stripped, only ten per cent of the debris created by Vaia will be left behind – in regions of the valley that are essentially inaccessible.

'Come here! Come here!' he yells excitedly. I jog over. He kneels down among some fresh grasses and young flowers, and gently cradles a tiny green plant with long, pointed leaves, no more than a couple of inches tall, in the palm of his hand. 'This, is a new tree,' he announces, a mixture of pride and joy in his voice. 'A new tree, growing naturally.'

Young shoots such as this are extremely valuable. As well as helping to rejuvenate the forest, they are critical for stabilising the high-altitude soils, in the process mitigating the risk of future landslides, rockfalls and flash floods in the valley, which could put numerous lives at risk.

TRENTINO TREE AGREEMENT

Unfortunately, this natural regeneration isn't happening quickly enough, which is why I find myself being led up a long, winding forest path by Paneveggio forest guide Girolamo Scarian. Girolamo wants to demonstrate one positive legacy from the dramatic events of three years earlier. He leads me to a large fence that surrounds a

small patch of land, the size of a tennis court or two, with nothing more than some long grass and bits of wooden debris inside.

This construction is part of the Trentino Tree Agreement, a locally organised collaborative effort (managed by the Autonomous Province of Trento, the official name for the region) to restore the damaged forests to health as quickly as possible. Three of Trentino's iconic forests – Paneveggio, Cadino and also San Martino di Castrozza, farther to the east – are in the process of being actively restored through the intentional planting of seeds. With no natural predators beyond a few wolves, the deer population here is substantial, so deer-proof enclosures are required to stop ravenous herbivores from devouring the soft, delicious new shoots.

'We didn't go geometrically – we didn't plant in lines,' Girolamo points out. 'Instead, we took a natural model. We analysed how trees are actually positioned in a forest and we tried to recreate the same dispersion of the trees. One of the best places to plant is next to the tree roots that are still there, because the roots trap humidity and it makes the soil more fertile. It makes a healthy micro environment.' They are also planting a mix of species together, since post-Vaia analysis showed that monocultures appear to have suffered more than areas with a diversity of species and ages (scheduled future plantings will ensure older and younger trees growing side-by-side).

Of course, all of this work – from obtaining satellite imagery and orchestrating tree clearing to carefully dispersing new tree seeds – costs money. Funding comes via the Trentino Tree Agreement, which works as a giant crowdfunding platform, inviting donations from people both locally and around the globe to pay for the replanting of new trees in the affected areas. In return for their hard-earned pennies, donors receive everything from regular updates to guided tours. Above this fenced-off area, a camera attached to the top of a long pole looks down upon the earth. 'The people that donate can see with their very own eyes what they're doing for the forest,' explains Girolamo. 'That's very important. They can come in person with a tour, or they can watch on a webcam.'

Despite the damage wreaked by Vaia, and the emotional trauma caused that night, in the long term there are more-substantial threats to these forests than the impact of one storm. Climate change brings unknown dangers and forest rangers are very worried about the spread of the European spruce bark beetle or bostrico, a tiny, copper-coloured insect that burrows deep into the crevices of weakened trees, feeding upon the internal tissues that supply nutrients from the roots, causing death within a matter of weeks. Even among lush, green forests unharmed by Vaia, it's not unusual to spot pockets of light brown – the ghostly remains of afflicted trees.

Now that the Vaia clear-up effort is almost complete, and the replanting in conjunction with the Trentino Tree Agreement is well underway, dealing with this secondary threat – which boomed in the years following the storm, with so many weak trees for the beetles to feast upon – has become the focus for conservation efforts.

PLUGGING THE 'HORRIBLE' GORGE

● As the city of Trento developed over the centuries, it experienced a number of disasters caused by a single river. Over 15,000 years, the River Fersina carved its way through the crumbly limestone and clay of the surrounding landscape, eventually creating a very deep, narrow, dark and gloomy canyon called Orrido, 'horrible' in Italian. 'It's not really a place where you are relaxed,' says Roberto Rossati, a local guide. 'It's more scary'.

It was certainly scary for the residents of Trento, who, for centuries, would have feared that any intense rainfall or passing storms would cause the river to surge and send large rocks crashing through the canyon. Stories abound of homes, churches, mills and bridges being demolished by enormous stones.

The first dam at the head of the Orrido canyon was built in 1537. Constructed using large logs, it had a very short lifespan – the beginning of a pattern that would repeat time and time again over the next three centuries. Eventually, in 1850, builders began to utilise limestone blocks, constructing a 40-metre-high artificial waterfall, designed to withstand the pressure of any rocks that were washed downstream.

After a large and deadly flooding event in 1882 (which the new dam resisted relatively well), the Austrian government, which administered the region at the time, made substantial investments in flood defences across Trentino. This included the construction of a second dam, 42 metres high, to provide some extra security for the residents of Trento. After it was opened in 1886, the stretch between the two dams began to collect debris and over the following century, enough rocky material accumulated to make it effectively impossible for the first dam to fail, as there was so much pressure pushing on it from both sides. Orrido also functions as a source of hydropower and is a popular tourist attraction, with a secure new viewing platform added in 2017.



CHRIS FITCH

Gazing wistfully at the surrounding mountains, decorated with a thick blanket of forest, albeit punctured with those pockmarked clearings left behind by Vaia, Paolo is adamant that replanting the forest as quickly as possible is a priority, one that requires a hands-on approach. 'Nature heals itself. With time, nature is self-healing,' he says, whimsically. 'But we need to help nature. We don't have patience. We don't have time to wait.' ●



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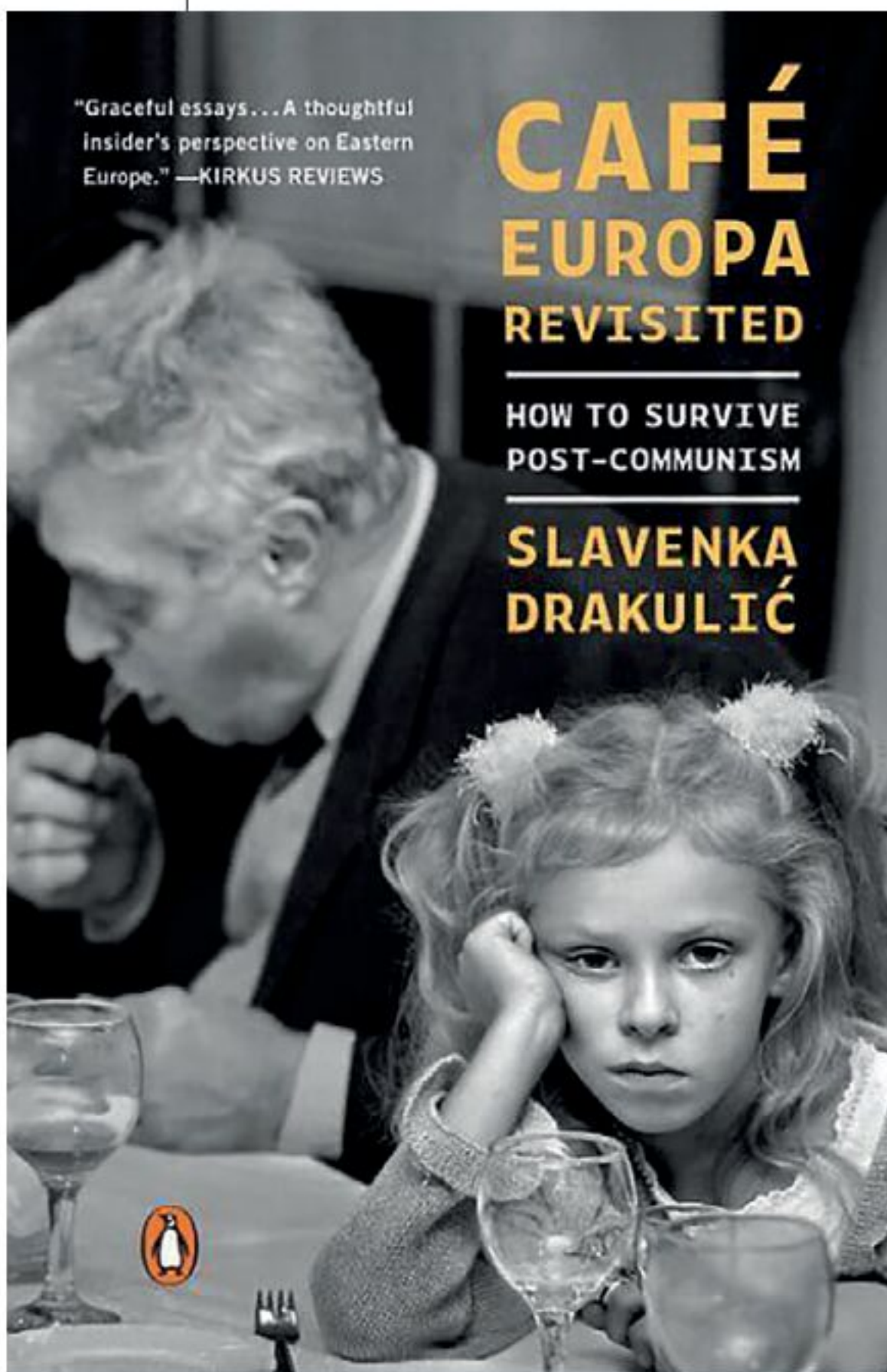
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REVIEWS



BOOK OF THE MONTH

CAFÉ EUROPA REVISITED
How to Survive Post-Communism
By Slavenka Drakulić
Penguin

■ In 1996, less than a decade after the fall of the Berlin Wall, Slavenka Drakulić wrote a series of essays on life in the fledgling 'new Europe' that emerged from this political earthquake. Under the title *Café Europa*, she explored the daily realities of life in an ostensibly reunited

continent. As she travelled between East and West, the ubiquity of cafes across Eastern Europe bearing the name 'Café Europa' became a repeated symbol of an aspiration towards a shared identity – an aspiration that didn't always seem to be reciprocated by these countries' Western neighbours.

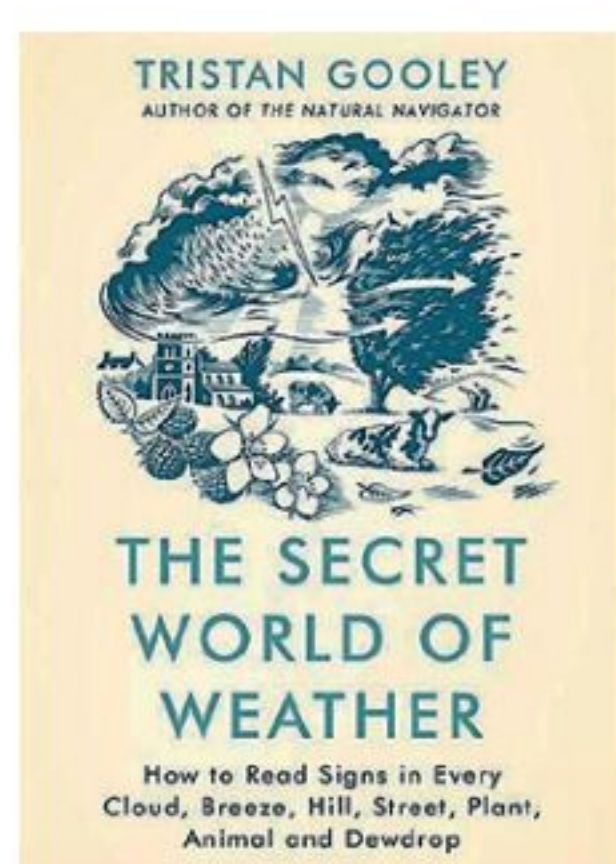
Thirty years after the collapse of the Communist bloc, Drakulić has more questions about this shared identity. In *Café Europa Revisited*, a new wide-ranging collection of essays, she zooms into and out of the social, cultural and political questions that dominate Europe today. Hailing from Croatia, once part of Yugoslavia, her success as a writer has afforded her a cosmopolitan experience that defines her perspective. While she was born and raised under Communism, she has lived extensively in Western Europe and, due to the relative lenience of Yugoslavia's cultural policy, she had access to British and US popular culture from an early age.

As we discover Europe through Drakulić's eyes, her gaze constantly scans between East and West, her feet planted somewhere between the two. At points, the breadth of her perspective may feel a little unwieldy

for a reader unfamiliar with her material. The opening essay, 'Once upon a time in 1989', sets the tone for the scope of the collection, exploring the disappointment that followed this pivotal year, as dreams of progress in a democratic and capitalist future were tainted by the rise of inequality and corruption. Although the essay captures the immediate disillusionment well, it rushes through a sweeping range of themes that could leave a reader dizzy: the role of religion in the Yugoslav Wars; corruption in Romania; the refugee crisis; the rise of nostalgia and nationalism. Perhaps this is a deliberate stylistic choice, a narrative whirlwind that shows Europe isn't static but constantly in a state of flux. However, Drakulić's writing feels strongest when it hones in on a particular issue and dissects its ramifications.

Elsewhere, Drakulić fluidly moves between her personal experiences and wider socio-political trends. Whether writing about regional differences in the way the #MeToo movement manifested itself across the continent, or the unequal quality of food between Eastern and Western Europe, the personal is always political.

Beginning with the story of a young Slovak boy who notices that Nutella tastes different while on holiday in Vienna, the essay 'European Food Apartheid' examines the controversy around consumer brands using lower-quality ingredients in Eastern European markets. For example, a study found that in Poland, Leibniz biscuits were found to contain five per cent butter and some palm oil, while in Germany they contain 12 per cent butter and no palm oil. Many similar discrepancies were found in a trend that scandalised consumers in post-Communist nations, who resented being treated as 'second-class citizens' in terms of diet. Political leaders seized on this outrage, which reached a fever pitch in 2017–18 as concerns reached the highest levels of the European Union. Drakulić writes: 'The food scandal demonstrated that a sense of belonging to the EU begins in the stomach of its citizens.'



THE SECRET WORLD OF WEATHER
How to Read Signs in Every Cloud, Breeze, Hill, Street, Plant, Animal and Dewdrop
By Tristan Gooley
Sceptre

■ It isn't meteorologists' fault that they can rarely predict weather on the small scale. They

don't have the tools or time to offer anything other than an educated guess as to how the weather across vast areas might develop, so they certainly can't tell you how the specific terrain and landscape might affect the microclimate in which you live. The devil, says Tristan Gooley in this marvellous new book, is in the detail. With just a little knowledge and fresh eyes, we can see how the weather in our own local climate is likely to develop.

Few of us are able to read nature's signs – we just don't notice things anymore – but Gooley does and in his surprising and absorbing books, such as *How to Read Water*, *The Natural Navigator* and now *The Secret World*

of Weather, he provides us with the tools. This third book consists of 22 chapters, many of which focus on phenomena such as clouds, wind, rain and dew, while others cover how terrain and specific ecosystems, such as hills, forests and towns, shape the weather. Some of it's basic common sense, but can still bring you up short: 'The Earth rotates towards the east, which means most winds blow in that direction too, flowing from west to east. This, in turn, means that most weather arrives from the west.'

Other little nuggets offer more obvious value to perambulating amateur meteorologists: 'The bigger the tree's leaves, the more rain gets through to the ground,' he writes. It seems that trees with big leaves offer much less refuge from the rain than those with needles, which tend to channel the rain down the tree's trunk, instead of onto your head. Who'd have thought?

The most winning aspect of this book, however, is Gooley's witty, conversational writing, which makes reading a joyful breeze.

PAUL CONNOLLY

The question of what it means to ‘belong’ in Europe runs through *Cafe Europa Revisited* and the theme of migration surfaces repeatedly. The essay ‘A Parrot in Sweden’ explores Drakulić’s own experience of integrating into life in Sweden, contrasting her privileged experience as the partner of a Swedish journalist with the refugees who arrived from her former homeland to escape the Yugoslav Wars. Throughout the collection, she highlights the factors that facilitate or hamper the possibility of integration, asking how questions of race, faith and language affect the welcome new arrivals receive. For Drakulić, Europe has characterised its Muslim populations as the new ‘other’ and she’s careful to warn against the trend of reducing people to a monolithic identity.

While the tone across the collection seems to warn of the old divides and new differences that define Europe today, one or two essays paint a particularly fond picture. ‘My Favourite Card’ is essentially an ode to the European Health Insurance Card and a reminder of the benefits European unity has brought to healthcare, although it

does lament the continent’s fragmented ‘every nation for itself’ response to the pandemic. The final essay, ‘My Brexit’, ends on a surprisingly nostalgic, even optimistic, note, reflecting on the author’s youth and the British music and fashion – from the Beatles to Mary Quant – that shaped her adolescence. Looking back at the referendum result, she writes: ‘The British and their culture are so much a part of European identity that even when they sailed away, we had the best of them and will continue to do so. No politicians in the world can pull out their threads of the colourful woven fabric of European culture.’

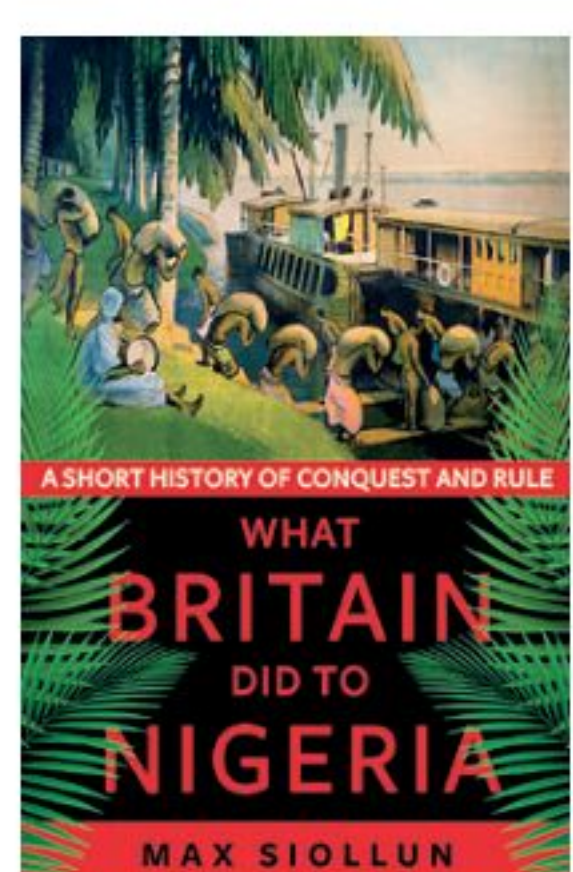
While her position on Brexit is implicit, Drakulić slips beyond simple political divides to celebrate how porous culture can be, no matter how hard borders become. As someone who grew up behind the so-called Iron Curtain, Drakulić knows this all too well. From her vantage point on both sides of a continent still trying to find itself, *Cafe Europa Revisited* offers a portrait of a Europe that’s fragile, but still whole.

YOSOLA OLORUNSHOLA



DZIUREK/SHUTTERSTOCK

A supermarket in Lubin, Poland. Investigations have shown that some large brands use different ingredients for products sold in Eastern Europe



WHAT BRITAIN DID TO NIGERIA
A Short History of Conquest and Rule
 By Max Siollun
 C Hurst & Co

■ A question that has dogged Nigeria’s history ever since its creation in 1914 runs through Max Siollun’s *What Britain Did to Nigeria*: does Nigeria make sense as a single country?

Beginning in the pre-colonial era, before the idea of a nation called Nigeria even existed, Siollun paints a picture of the multi-ethnic, multi-faith societies that inhabited this region of West Africa. On the southern coast, contact with Europeans began during the 15th century, when Portuguese explorers began to trade with the Benin kingdom. Over time, this relationship deteriorated into one of domination and exploitation as the trans-Atlantic slave trade took hold. This early contact also paved the way for Christian missionaries and colonial agents to shape the cultures, laws and

systems of southern Nigeria. In the north, an Islamic revolution that began during the early 19th century transformed the religious landscape of the region, dominated by the Sokoto Caliphate, which governed as a theocracy. Siollun roots much of his narrative in the key cultural differences between the north and the south, which the British reinforced as they plotted to conquer both regions. He deftly manages a complex history, highlighting the fact that Britain’s conquest of Nigeria wasn’t immediate, but required nearly 70 years of military conflict to complete.

More than 60 years post-British rule, Nigeria’s Independence Day celebrations this year were tainted by the memory of protesters murdered in Lagos in October 2020 during a demonstration against police brutality and corruption. While it doesn’t attribute all of Nigeria’s woes to the experience of colonialism, *What Britain Did to Nigeria* provides a valuable insight into the causes of the fault lines that continue to destabilise the country today.

YOSOLA OLORUNSHOLA

REVIEWS



FREE
Coming of Age at the End of History
 By Lea Ypi
 Allen Lane

■ Born in Albania, the last Stalinist outpost in Europe, during the late 1970s, Lea Ypi was a true believer, convinced by her teachers and the state that Enva Hoxha, the country's Communist leader, and Joseph Stalin were without equals. She repeatedly pressured her parents to get a framed photo of Hoxha to put on top of their television, and at one stage hugged a statue of Stalin while protesters chanted pro-democracy slogans nearby. Then the revolution came and in December 1990, everything changed; almost overnight, Communism was viewed as evil, or at the very least deeply flawed.

In *Free: Coming of Age at the End of History*, Ypi has written a profound memoir of a childhood spent trying to understand what it was to be a good Communist and then being forced to deal with what came after.

Now a professor of political theory at the London School of Economics, Ypi's early years were filled with propaganda and slogans. Her parents were intellectuals and her upper-class grandmother spoke to her in French and had even attended the wedding of Albania's last monarch, King Zog. Yet, while her family talked in code

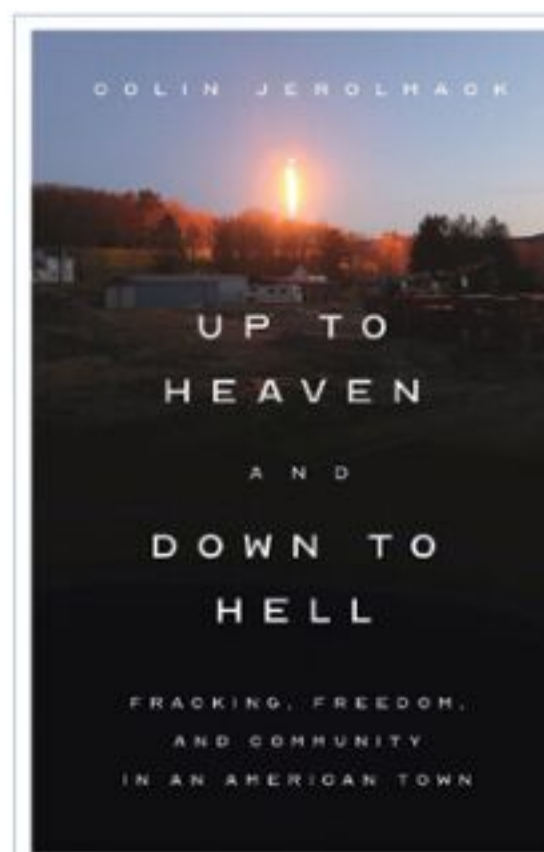
about relatives and friends jailed for sedition – who had 'gone to university' as they phrased it – Ypi remained blissfully unaware, spending her days learning of the glories of Communism and feeling sorry for the foreign children who vacationed on nearby foreigner-only beaches.

While the brainwashing – and subsequent un-brainwashing – of children during the Communist period is interesting, it's the chaos of the 1990s that's far more eye-opening. As Albania sought to become 'like the rest of Europe' (as many put it), it pushed through structural reforms that left many out of work and then succumbed to pyramid schemes that wiped out the savings of more than half the population. The result: a mass exodus and a brief civil war that left more than 2,000 people dead.

Trying to study during rolling blackouts while gunfire rang out on the streets, Ypi was among the generation struggling to make sense of this new world, while also trying to decide whether to stay or go. One of her best friends fled shortly after the revolution, only to become a prostitute in Milan.

Shortlisted for the 2021 Baillie Gifford Prize for Non-Fiction, *Free* is a beautiful memoir, written by a gifted storyteller who is able to balance the dark with the light. There are few books written in English about Albania and it would be a shame to miss this unexpected gem.

KIT GILLET



UP TO HEAVEN AND DOWN TO HELL
Fracking, Freedom, and Community in an American Town
 By Colin Jerolmack
 PUP

■ In 2013, New York environmental studies professor Colin Jerolmack moved to the 'down-on-its-luck' Appalachian rust-belt community' of greater Williamsport, Pennsylvania. The state was being called 'the Saudi Arabia of natural gas' amid a boom in shale-gas extraction (known as 'fracking') fuelled, in part, by landowners' leasing their mineral rights to private companies. Although many of Jerolmack's students were critical of the industry and those behind it, none – nor Jerolmack himself – had ever seen a gas well or met a lessor. Realising that the issue spoke to the USA's rural-urban divide, and eager to burst any possible 'filter bubble', Jerolmack sought to hear directly from those involved. The result is a deeply considered ethnography, fusing an anthropologist's eye for detail with a sociologist's sense of how social structure shapes individual action.

Only in the USA, Jerolmack writes, do 'private citizens own the majority of the mineral estate' and have 'the exclusive right to enter into private negotiations with a third party to extract subsurface gas and oil – and profit from it'. This contributes, in the case Jerolmack describes here, to a classic resource dilemma, whereby the 'pursuit of self-interest results in the degradation of a shared resource'. There seems no better illustration of this than Jerolmack's description of an environmentalist who had nonetheless leased her mineral rights, as the resulting bonus seemed 'the only possible compensation' for the effects of her neighbours leasing theirs: noise, anxiety,

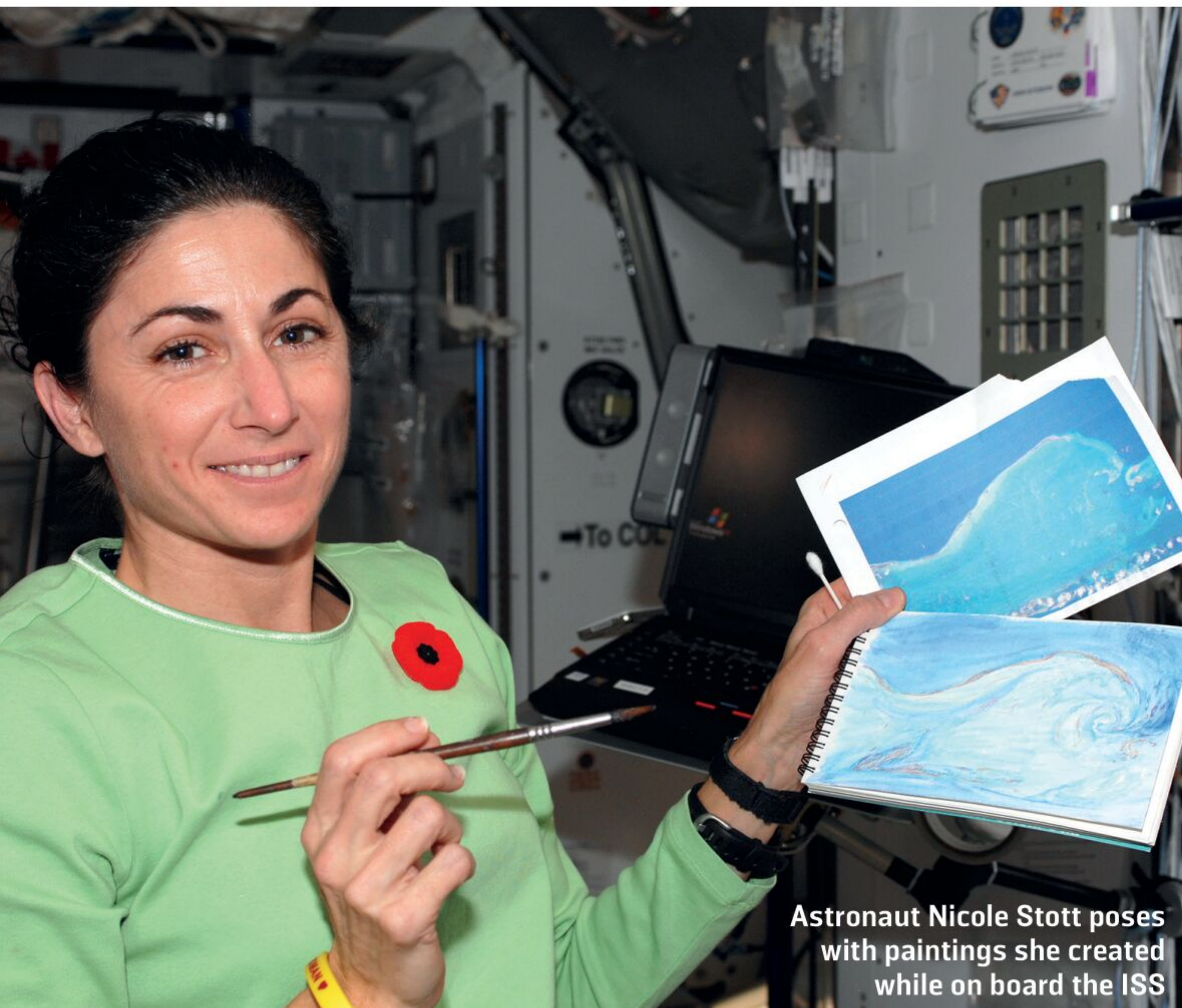


JAMES KIRKIKIS/SHUTTERSTOCK

shattered peace. Meanwhile, even those who leased to express their liberty (and property rights) could feel shackled by the ensuing indignities: signage, traffic, guards at the gate.

But this doesn't mean that those affected felt like victims or dupes. Indeed, the 'fractivism' of liberal outsiders could alienate locals, who were protective of individual choice and community, and fiercely alert to paternalism. Nor can lessors be crudely condemned; the resource dilemma they face is the result of a 'legal and political structure' (and anyway, many of us make choices – flying, eating meat – that limit others' ability to 'enjoy environmental goods'). 'Live and let live', Jerolmack shows, has its costs and contradictions. The fracking story has evolved, but his work reminds us that no man, nor property, is an island. As climate change advances, we deny this at our peril.

ALICE BLOCH



Astronaut Nicole Stott poses with paintings she created while on board the ISS



BACK TO EARTH
What Life in Space Taught Me About Our Home Planet - and Our Mission to Protect It
 By Nicole Stott
 Seal press

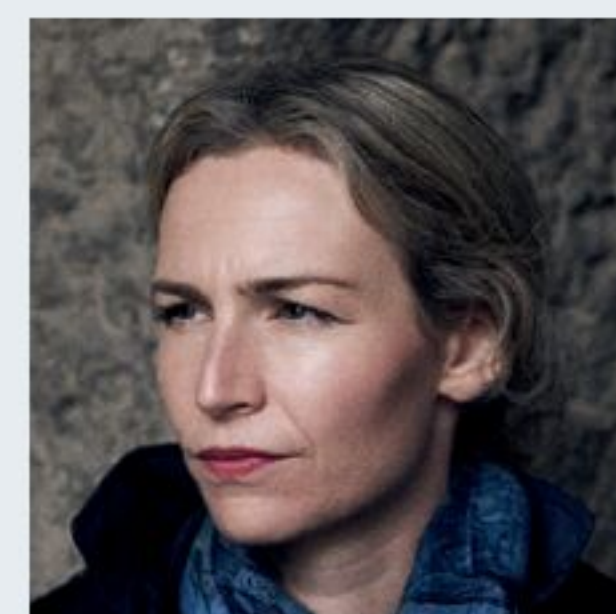
■ Very few of us will ever get to venture into space, but for those who do it is not just a dream come true, a scientific pursuit, or a step for mankind – it is also a profound experience, and one that can in some small way, be passed on to those below. We have known this ever since astronaut William Anders took his famous Earthrise photo on 24 December 1968. Said to have played a huge part in galvanizing the environmental movement, it suggests that there is something about looking down at the planet that inspires us to protect it.

Nicole Stott's book, *Back to Earth*, is very much in this vein. Now with her feet firmly on the ground, the retired astronaut, who undertook two spaceflights and spent 104 days living and working in space as a crew member on both the International Space Station (ISS) and the Space Shuttle, dedicates much of her time to passing on the lessons she learned. These lessons are largely drawn from the extraordinary international cooperation that the ISS represents, where, since 2000, 15 countries have peacefully worked together. It is, says Stott, a 'model for how we should be living and working together as the crew of Spaceship Earth'.

Rather than strict commandments, each chapter loosely highlights a particular 'way of being', taken from life in space – including 'act like everything is local' and 'never underestimate the importance of bugs'. There's no hint of preachiness and, in fact, the bulk of the narrative is taken up with fascinating stories of Stott and others' time spent in space – sure to please anyone who wishes more than anything they could experience it themselves.

Stott's 'ways of being' really boil down to being respectful of your environment. On the ISS, this is essential to ensure the survival of the crew. But, of course, it's a good analogy – the same applies to the planet as a whole. This is then both a manifesto and a memoir, fascinating for anyone interested in space travel, environmentalism or ideally, both.

KATIE BURTON



WRITER'S
 READS

Lea Ypi is a professor in political theory at the London School of Economics. Her book, *Free: Coming of Age at the End of History*, is out now

■ **The Iliad**

By Homer (eighth century BCE)

When I grew up in Albania, we didn't have many children's programmes on TV, but we did have several adaptations of classical Greek literature. Eventually, I ran out of supplies, so my parents gave me the *Iliad*. I was fascinated by Achilles: how could the strongest of Greek heroes be both so powerful and so needy at the same time?

■ **Martin Eden**

By Jack London (1909)

Impossible love, art, politics, class divides, ambition, triumph and death. I don't think I've cried so much with anything else I've read ever since.

■ **The Demons**

By Fyodor Dostoevsky (1871)

My favourite novel ever. It depicts the conflict between populists and modernisers in 19th-century Russia, and offers one of the most sophisticated routes into the political and moral tragedies of the 20th century.

■ **Fathers and Sons**

By Ivan Turgenev (1880)

Women in 19th-century novels written by men are typically vulnerable, easily manipulated creatures. Not so the fierce Madame Odintsova.

■ **War and Peace**

Leo Tolstoy (1869)

This kept me company in 1997 as I prepared for my A-levels with Kalashnikov bullets falling on my window sill. This sentence has stayed with me: 'The higher the human intellect goes in discovering more and more purposes, the more obvious it becomes that the ultimate purpose is beyond comprehension.'

■ **Memoirs of a Dutiful Daughter**

By Simone de Beauvoir (1958)

There may be other books by De Beauvoir that better highlight the views of this feminist icon, but I don't think any of them are as beautifully written, relatable or touching.

■ **Things Fall Apart**

By Chinua Achebe (1958)

This book is about life in pre-colonial Africa, but it's also so much more. It explains how colonialism isn't simply the result of Western ambitions to acquire land and resources, but at a deeper level, of ignorance about other people's traditions, combined with epistemic arrogance – the claim to know better than them.



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ALL ABOARD AMAZING

GALLERY

■ Vita Potter (Latvia/UK) harvests stock flowers at EM Cole Farms in West Pinchbeck



The flower fields

Photographer Tessa Bunney, who has been photographing rural life for more than 25 years, captures the work of flower farmers and pickers around Spalding, Lincolnshire

Words by Caroline Beck

The British love affair with flowers is intense. A casual trawl through social media feeds shows that flowers come freighted with love and hope, perhaps even more so during the pandemic

year of 2020, when a simple bouquet stood in for the human contact we were forbidden. From the overlooked wildflowers growing in the scrubby margins of our cities to the flower that most symbolises the garden in high summer – the scented rose – people were appreciating flowers afresh, a sign of renewal in a world that seemed to be so full of despair.

We've been buying bunches of flowers for our delight for centuries, but it was only in around 1800, when transport links improved significantly, that it became possible to pick flowers, take them to market and sell them within the

space of a few days. Violets, snowdrops and daffodils all made their way to flower markets in our towns and cities, and as the country became increasingly prosperous, more exotic flowers replaced the simple country blooms.

The vast majority of the flowers now grown here originated from other parts of the world, brought back during the 18th and 19th centuries by plant hunters who collected, preserved, then sent back their specimens to places such as Kew Gardens and the Botanic Garden in Edinburgh to be propagated and distributed to wealthy, well-connected plant collectors. Flowers

■ Hydroponically cultivated tulips, in which plants are grown in a nutrient-rich solution rather than soil



had cachet. 'Florists' were then mainly men, committed, ingenious and highly competitive growers of specifically bred ornamental flowers such as auriculas, tulips and carnations with their own societies, shows and jealously guarded professional standards.

Throughout the 20th century, the majority of flowers sold in the UK were home grown on hundreds of market gardens and family farms. For most of these small growers, the death knell came after the global expansion of the flower market in the early 1980s, which coincided with the relative decrease in the cost of air freight. Now, when you

buy a rose it's more likely to have been grown in Kenya than Kent. Although a few businesses clung on, fighting labour costs and low margins, seasonality went out the window and flowers became as ubiquitous as tomatoes. The growers who weathered the storm were forced to diversify into more lucrative and sustainable cash crops and much of the expertise in growing was lost. By the turn of this century, UK flower production was confined to a small number of growers specialising in flowers such as tulips, irises, sunflowers and narcissi, mainly grown under glass, many using hydroponic technology (where plants

are grown without soil and fed using a mineral- and nutrient-rich solution) and selling through supermarkets.

In the past five years, a rise in small artisan growers has countered this narrative of decline and although their colourful flower fields often grab the headlines, they hide the few large-scale flower growers who've been quietly diversifying, mechanising and growing hectares of flowers instead of more traditional crops. But the past few years have seen significant challenges to these growers. The Brexit vote in June 2016 was the first distant rumble of trouble. Flowers are a highly perishable product,

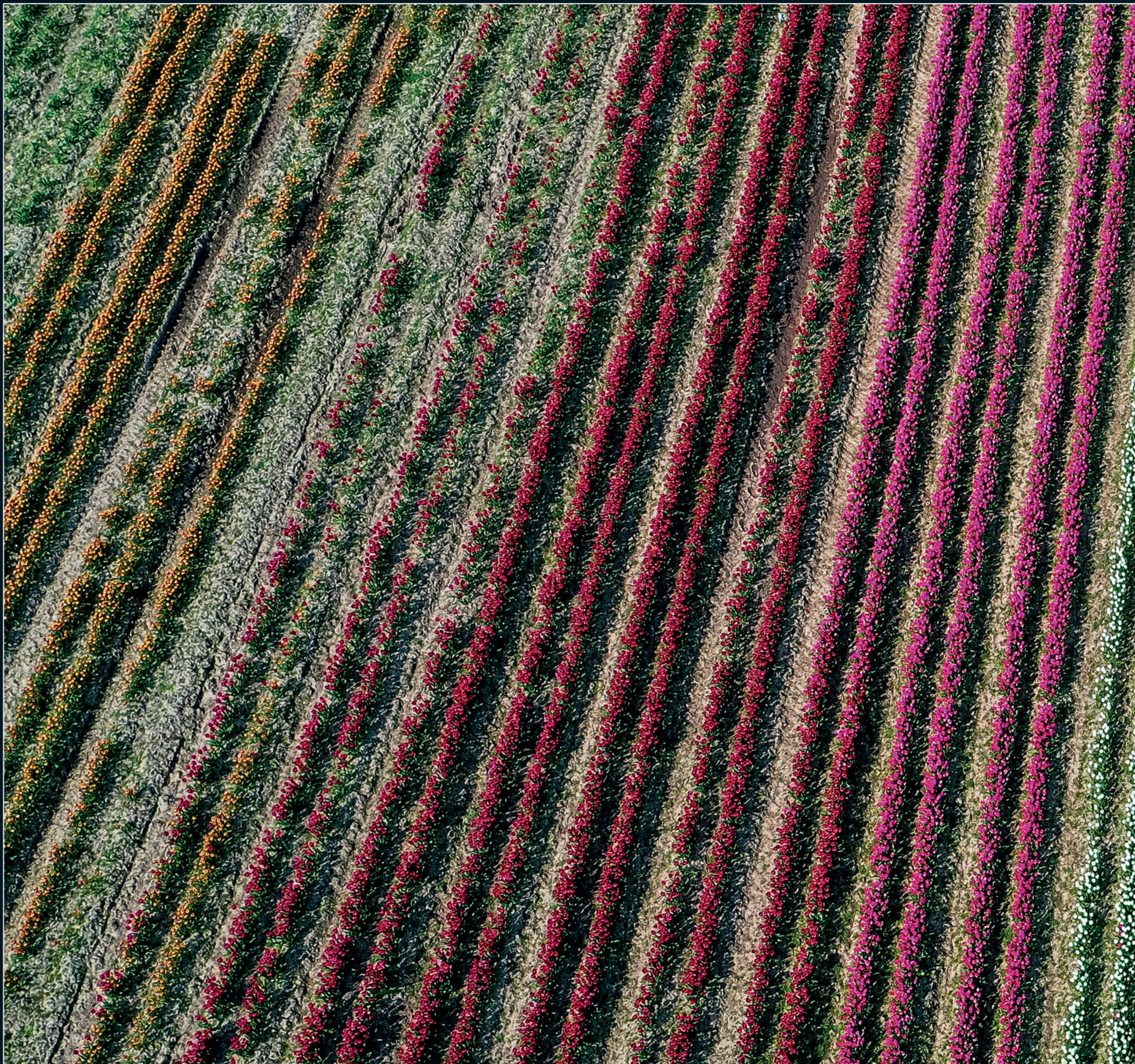


■ Zita Bumblauskiene (Bulgaria) harvests rose lilies at EM Cole Farms



■ A picker harvests sunflowers at JB Robinson & Son, Quadring Fen





needing quick and efficient picking and transportation at certain times of the year, which often relies on seasonal migrant labour from Europe. As it became obvious that free travel between member states would end when the UK left the EU, growers started to panic about how this would affect their ability to harvest their flowers. 'Brexit is a disaster for most of us,' one Lincolnshire-based grower told me at the time. 'It's not just the seasonal labour, it's also the fact that when we leave on 1 January 2021 we'll have to pay VAT and tariffs on imports such as tulip bulbs from Holland, which will significantly increase our costs.'

But 2019's general uncertainty and gloom about Brexit was as nothing compared to what was to come in March 2020. The UK's sudden lockdown as a result of the coronavirus pandemic couldn't have come at a worse time. The income from flower growing flows in from April to October, so most growers had just gone through their leanest months financially, made significant investment in stock, such as bulbs, and were expecting to reap the rewards when everything shut down overnight.

Mother's Day, a time when millions of bunches of flowers would usually be sold, came on 23 March, the very

weekend of lockdown. Instead of brightly coloured bouquets adorning the shops, photographs of millions of dead cut tulips being bulldozed and thrown into landfill circulated around the world. Easter was in early April and the situation was little better. 'There was no-one to pick and no market to sell to,' said one tulip grower who had to throw away more than half a million cut stems during the first fortnight of lockdown.

Slowly, however, the situation improved as flowers became a way of communicating with friends and relatives at a time when social isolation was the law. By mid-April, demand had bounced

■ Some of the 250,000 tulips in full bloom in a Lincolnshire field farmed by Multiflora Flowers, Holbeach, April 2020



back and, in some cases, even exceeded the previous year. 'We sold everything we grew and although every week things felt on a knife edge, we got through.' Despite the demand, most growers lost between £25,000 and £100,000 because of the lockdown and many more have been left feeling bruised and uncertain about the future.

We've enjoyed a cheap and abundant supply of flowers all year round for more than 40 years, but in embracing the global, we've lost the local. The wholesale cost of producing flowers will undoubtedly rise as a result of Brexit, but growers are repeatedly told by

the supermarkets that they won't be passing on extra production costs to their customers. That's us. Once, flowers were a little bit of affordable luxury. Now, they scarcely represent their production costs, cheaper than a Friday night takeaway. But what we're in danger of losing isn't only expertise in cultivation that has been built up over decades, but family businesses who support much more than their own bank balance.

If 2020 has taught us anything, it's that the local isn't immune to the global, and that both must be valued and nourished. It was a year for noticing the natural world, from the park to the

hedgerow to the garden. Growers across the country are hoping that the next time you buy a bunch of flowers, you'll think not just of the cost, but of the human hands that have patiently grown, picked and transported them so that you can admire them on your kitchen table.



The Flower Fields is published by NEPN. To purchase a copy, visit www.tessabunney.co.uk

GALLERY

- Trevor Tyrrell harvests daffodils, at JW Tyrrell & Son, Cowbit



- A worker plants stock seedlings at Lambs Flowers, Pinchbeck





■ Rasute Petrosiame (Lithuania) harvests hydroponically grown tulips

Speak the wind

For some inhabitants of the chain of islands in the Strait of Hormuz in southern Iran, the wind has a metaphysical quality. Many here hold an ancient belief in *zār* – a type of spirit or ‘possessing wind’, capable of causing physical and mental illness. Fascinated by the belief in this supernatural force, Tehran-born photographer Hoda Afshar wanted to capture the invisible forces at work in her new book, *Speak the Wind*.

Belief in *zār* is found throughout northern and eastern African countries such as Sudan, Egypt, Ethiopia and Somalia. It’s believed to have been imported to the Middle East through the Arabian slave trade – an intercontinental operation that spanned 14 centuries in which Arab traders brought slaves from East Africa to the Persian Gulf. Some people believe that the possessing wind is a spiritual entity that represents the physical cruelty endured by the slaves. It’s this complex interplay between history, religion and culture that Afshar sought to make visible. ‘Images play a really important role in our understanding of the world,’ she says. ‘In this project, it was about the invisibility of the history of slavery and cruelty that has affected this region.’

Afshar travelled to the Strait of Hormuz several times between 2015 and 2020, each time becoming more enchanted by the ethereal crimson landscapes. In her work, she focused in particular on the jutting structures of earth that are shaped by the wind – the dwelling places of the *zār*, according to some locals. By layering stencil images of the spirits, hand-drawn by the locals she met, onto black-and-white images of the landscape, she attempted to capture connections between the spiritual plane and the material world. These were supplemented by photos of locals performing an ancient dance in which the seemingly-possessed supplicate at the feet of shamans, who are thought to be the only people capable of making peace with the possessing wind. ‘By photographing the performance, I wanted to use the language of documentary, but give the agency back to the subjects themselves,’ says Afshar.

As she learned more about the culture of the region, Afshar came to admire



the people’s spiritual attachment to the landscape. ‘These are people living outside of the world’s metropolitan centres. When you arrive there, they see the metropolitan world as primitive and its people as being detached from nature,’ she says. She felt that the usual expectations of prosperity were inverted.

‘The wealth they believe in exists outside of the visual realm. For them, we are the ones unable to connect meaningfully with the landscape and its energies. That level of connection with the land, and the way that people define themselves through it, is something that I think is almost gone from the West.’ ●



PURPOSE

■ 'Photography helps me to make sense of the unknown.'

INSPIRATION

■ 'My inspirations are mostly cinematic – Andrei Tarkovsky is a favourite. His use of landscape to communicate complex human emotions and relationships is one of the greatest inspirations of my life.'

ADVICE

■ 'I would recommend picking an idea that is close to the heart. Don't make work about what's expected. Make it about what is true to you.'

Where in the world?



Clue: Island lifestyles of the rich and famous



Clue: Famously blustery



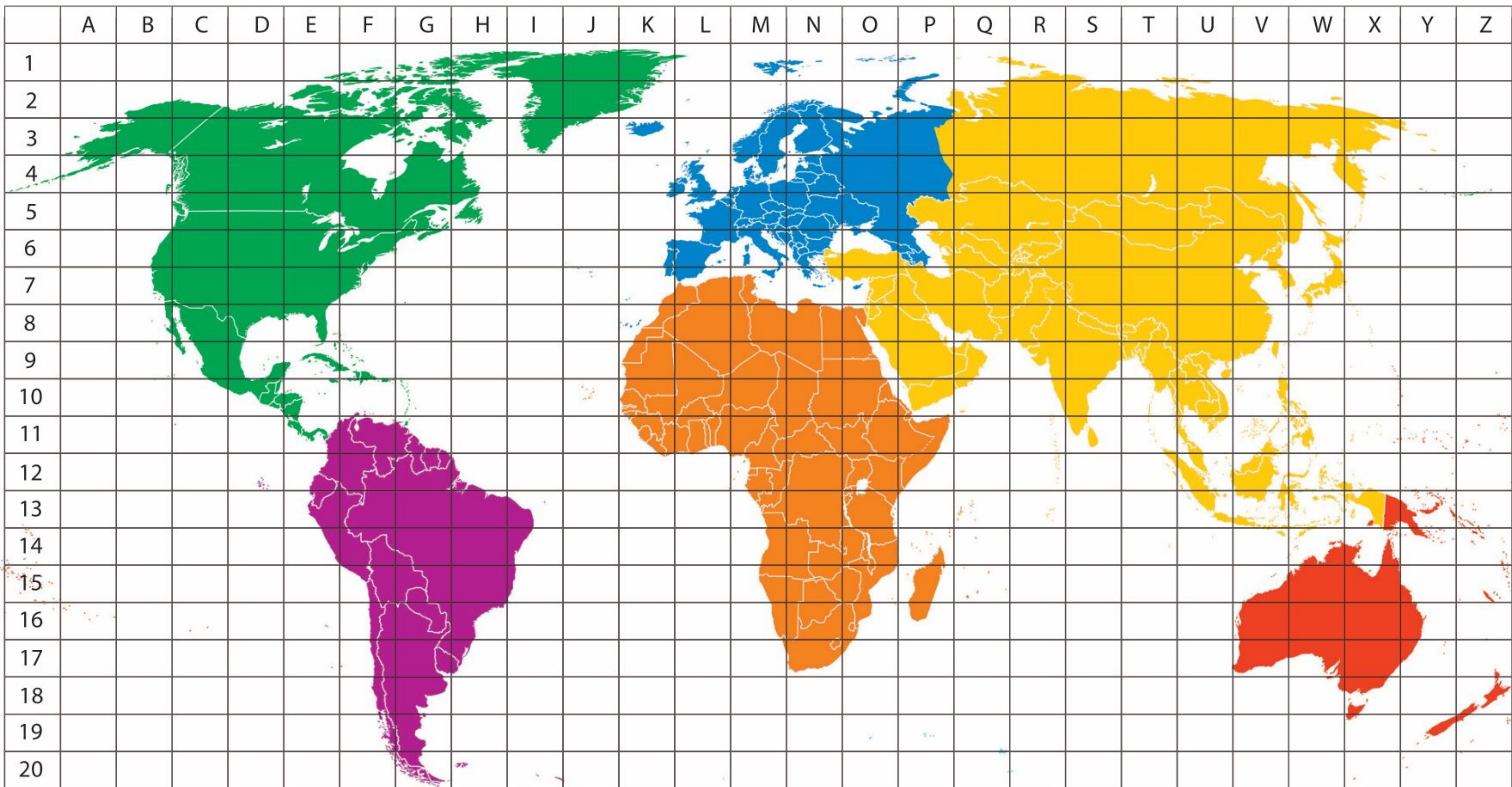
Clue: Straddling two continents



Clue: This nation's capital city (but not its most famous)

IMAGES SHUTTERSTOCK

Can you identify these iconic cities and plot them on the map below?
Find the correct coordinates at the bottom of page 82

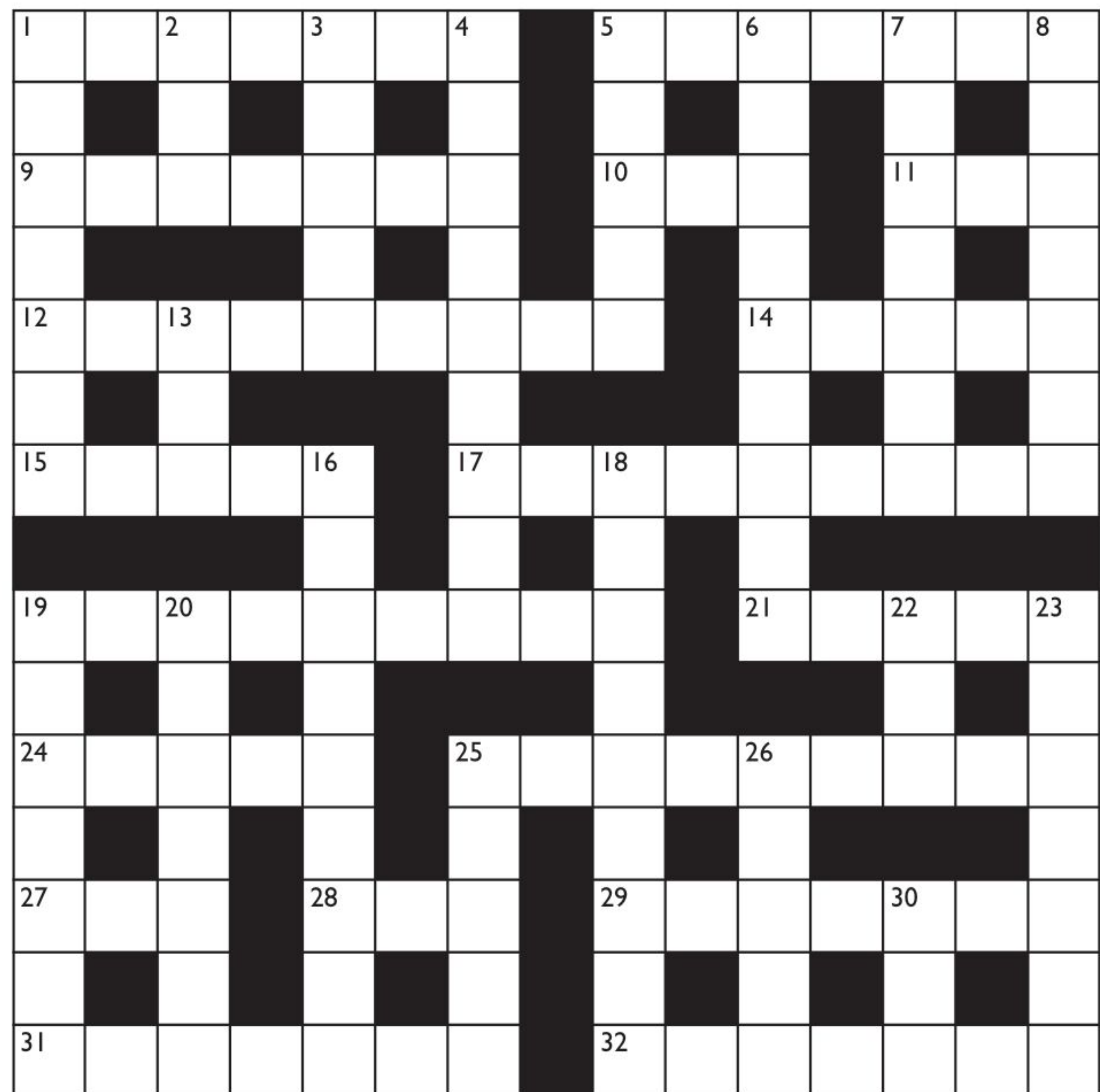


ACROSS

- 1** Thumbin' a lift to Herts town? (7)
5 Wind in France produces light fog towards centre of Urals (7)
9 and 10 A bears' nest reconstructed in part of the Arctic Ocean (7,3)
11 and 24 across French red given our treatment! (3,5)
12 What a clairvoyant reads about Cockney thieves? (3,6)
14 Back in force, see gaggles of these (5)
15 They go in and out and backwards in these ditches (5)
17 Oil for new car built around November (9)
19 Oscar is into new Spectrum IT equipment (9)
21 It points the way to breakdown or war (5)
24 See 11 across
25 Disturbing files lead to Conservative biography (4,5)
27 Wager it's central Tibetan (3)
28 The point of writing? (3)
29 Italian dish made from tortoise lacking enthusiasts initially! (7)
31 Tool is universal, and unusually silent (7)
32 Insect in secure surroundings here in New Mexico (5,2)

DOWN

- 1** Regular practice round edges of tundra is to find where animals naturally live (7)
2 Dartmoor peak not so far finally (3)
3 When geography reveals an ancient monument (5)
4 Hell is van breaking down in US state capital (9)
5 Medical leader poses question: 'What should we wear during pandemic?' (5)
6 Tim leaves animal rights movement for Tibetan utopia (7-2)
7 I arrive confused in the south of France (7)
8 Not strict about Tenniel translation (7)
13 Help with article on identification (3)
16 French wine of eastern US manufacture (9)
18 Former US President dismisses forest conflagrations (4,5)
19 Caringly bought half of reindeer (7)
20 Canadian lawman changes into uniform on time (7)
22 Topless threesome in South American city! (3)
23 New owners include bicycle centre in Lake District Pass (7)
25 In general, I believe it's considered written defamation (5)
26 Is this included amongst various USA names? (5)
30 The Englishman always heads for a cuppa! (3)



NOVEMBER CROSSWORD SOLUTION

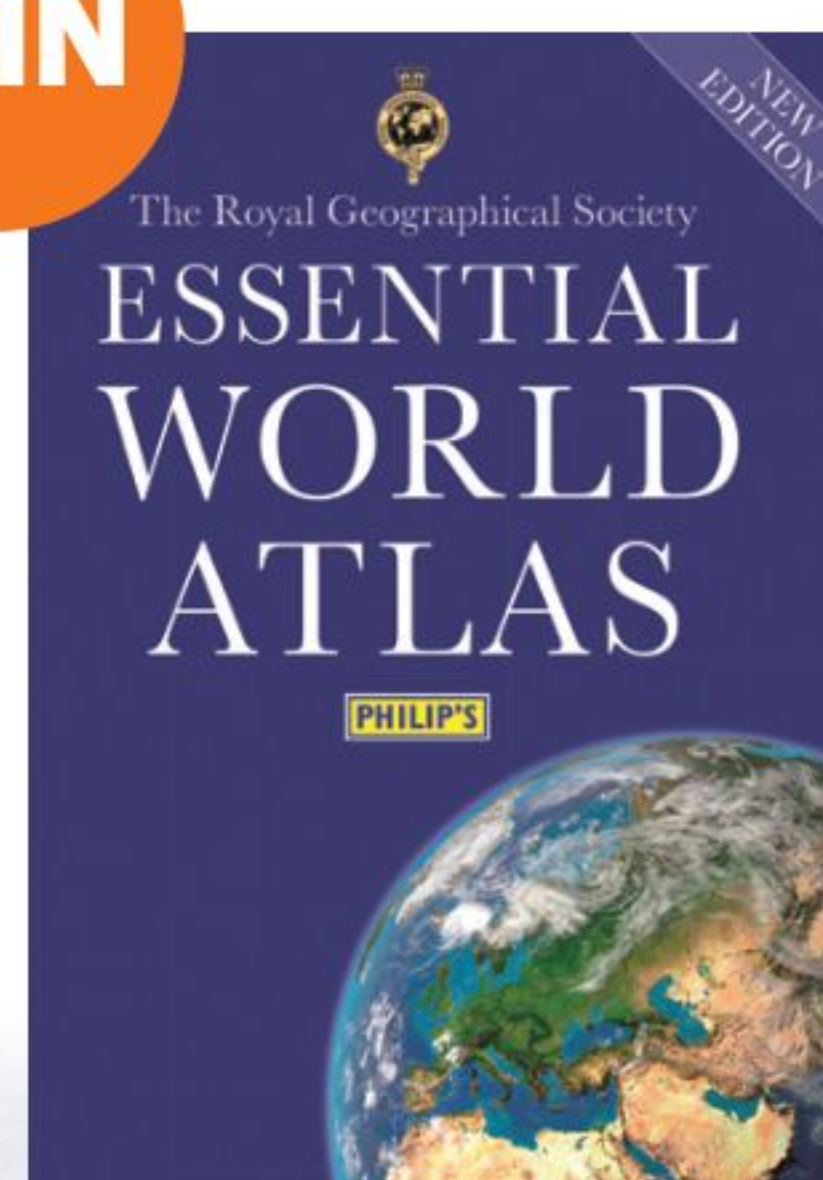
ACROSS

Across: 1 Forecast 5 Antler 9 Red wines 10 Persia 12 Tern 13 Eclipse 17 Adolescent 19 Let 21 Don 22 Bass Strait 24 Reserve 25 Dark 28 Abroad 30 Manitoba 31 Entrap 32 Mainland

DOWN

Down: 1 Fort 2 Rude 3 Cliveden 4 Stein 6 Needle 7 Las 8 Real estate 11 Tennis 14 Palmas 15 Lauderdale 16 Pounds 18 Chased 20 Star sign 23 Armada 25 Drama 26 Doha 27 Rand

WIN



Download your entry at: geog.gr/cross_word or simply fill in and cut out the grid above. Send your entry to the editorial address on page four, marked 'December crossword'. Entries close 21 June. The first correctly completed crossword selected at random wins a copy of Philip's Essential World Atlas, a comprehensive hardback atlas worth £25. For details, visit www.octopusbooks.co.uk

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ROYAL GEOGRAPHICAL SOCIETY (WITH IGB) SELECTION OF EVENTS FOR DECEMBER

1 December 1.00pm – 1.30pm

Earth stories (Lecture, online)

In our new series of lunchtime lectures we will share stories of those working to create a just and more sustainable world within planetary boundaries.

■ Venue: Online
Tickets: Free.
geog.gr/EarthStories

2 December 7.30pm – 9.00pm

Around the world in 30 years: a diplomat's journey (Lecture, in-person)

Andrew Heyn will reflect on his distinguished diplomatic career in the UK Foreign Office from 1989 to 2020 and discuss how foreign policy has been carried out in this period of dramatic geopolitical change.

■ Venue: Elmwood Building, Queen's University Belfast, Elmwood Avenue, Belfast, BT7 1NN
Tickets: Free.
geog.gr/Diplomat

6 December 6.30pm – 7.45pm

I belong here: a journey along the backbone of Britain (Lecture, online and in-person)

In this Monday night lecture Anita Sethi, author of the acclaimed book *I belong here: a journey along the backbone of Britain*, explores nature, wildness, walking and what it means to belong.

■ Venue: Online and in-person at Royal Geographical Society (with IGB), 1 Kensington Gore, London, SW7 2AR.
Tickets: Free. RGS-IBG members only.
geog.gr/IBelongHere

6 December 7.00pm – 8.00pm

A woman in the polar night: book club (Discussion, in-person)

A classic memoir that tells the incredible tale of a woman defying society's expectations to find freedom and peace in the adventure of a lifetime.

■ Venue: Royal Geographical Society (with IGB), 1 Kensington Gore, London, SW7 2AR.
Tickets: £10, RGS-IBG members £8.
geog.gr/InThePolarNight

7 December 7.00pm – 9.00pm

The Sami people and natural history of Lapland (Lecture, in-person)

The East of England regional committee's end of term and Christmas gathering is a wildlife and natural history study of the Sami people in the Arctic Circle.

■ Venue: Blake Studio, Norwich School, 71a The Close, Norwich NR1 4DD
Tickets: £5, RGS-IBG members and students free.
geog.gr/Lapland

9 December 7.30pm – 8.30pm

Younger Members' Committee Christmas quiz (Quiz and buffet, in-person)

Come one and all to test your general and geographical knowledge at a festive quiz organised by the Younger Members' Committee. There will be prizes for the best dressed in festive attire! Maximum of five per team; all over 18s welcome.

■ Venue: RGS-IBG
Tickets: £20, RGS-IBG members £16 (includes buffet)
geog.gr/ChristmasQuiz

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The lake behind the buildings of Annandale Water Services, Scotland



Derek Croucher / Alamy

Oil and water

For Discovering Britain this month Rory Walsh takes a break beside a Scottish motorway

A motorway service station may seem a strange place to explore Britain's geography. They are usually bland and forgettable, brief stops on the way to somewhere else. Annandale Water though is eye-catching and eye-opening. 'I'd never seen services like it', says professional geographer Chris Speight, this viewpoint's creator. 'Usually they're grotty – diesel spills, litter, fumes – but Annandale Water has two halves.'

Behind the buildings is a picturesque lake, which gives the service station its name. Trees rustle in the wind. Geese call across the water. A path surrounding it provides a welcome walk. On previous visits, Speight watched a heron. 'In spring and summer you can smell the foliage, yet you're only about 150 metres from the diesel pumps. It's a strange sensation, going from somewhere very fast-paced and noisy into quiet and calm.'

Besides tranquility Annandale Water has another appeal. The services are near Junction 16 of the A74(M),

the main road across Scotland's southern uplands. Speight explains, 'Annandale Water is about halfway between Yorkshire and the Highlands. It's an ideal location to stop for a break. Plus, you glimpse what the surrounding landscape has to offer.'

The motorway isn't the only long-distance route through Annandale. The West Coast Mainline railway also runs nearby. At the lake, the reason becomes clear. A series of undulating, high hills line the horizon. These imposing obstacles are too difficult for railways or major roads to cross. Instead, traffic and trains follow a gentler course along the valley floor of the River Annan. Annandale Water's outline is thought to be the remains of

a lost meander, where the river looped to form an oxbow lake.

Modern motorists weren't the first people to take advantage of the valley. East of the motorway is a Roman road. When the service station was built in the 1990s, workers uncovered a Mesolithic site. Annandale Water is a reminder that today's human infrastructure is often shaped by the ancient natural world, in this case the Caledonian Orogeny of 450 million years ago.

For Speight, the services have a poignant feature. 'The site is densely wooded, which always reminds me where fossil fuels come from. Coal comes from trees, oil from the marine equivalent. Seeing the woods near the petrol station is almost like tracing a journey from cradle to grave.' Annandale Water now has charging points for electric vehicles. It's said that to know where we're going, we need to know where we've been. We also need to know where to stop.

You can smell the foliage, yet you're only about 50 metres from the diesel pumps



VIEW
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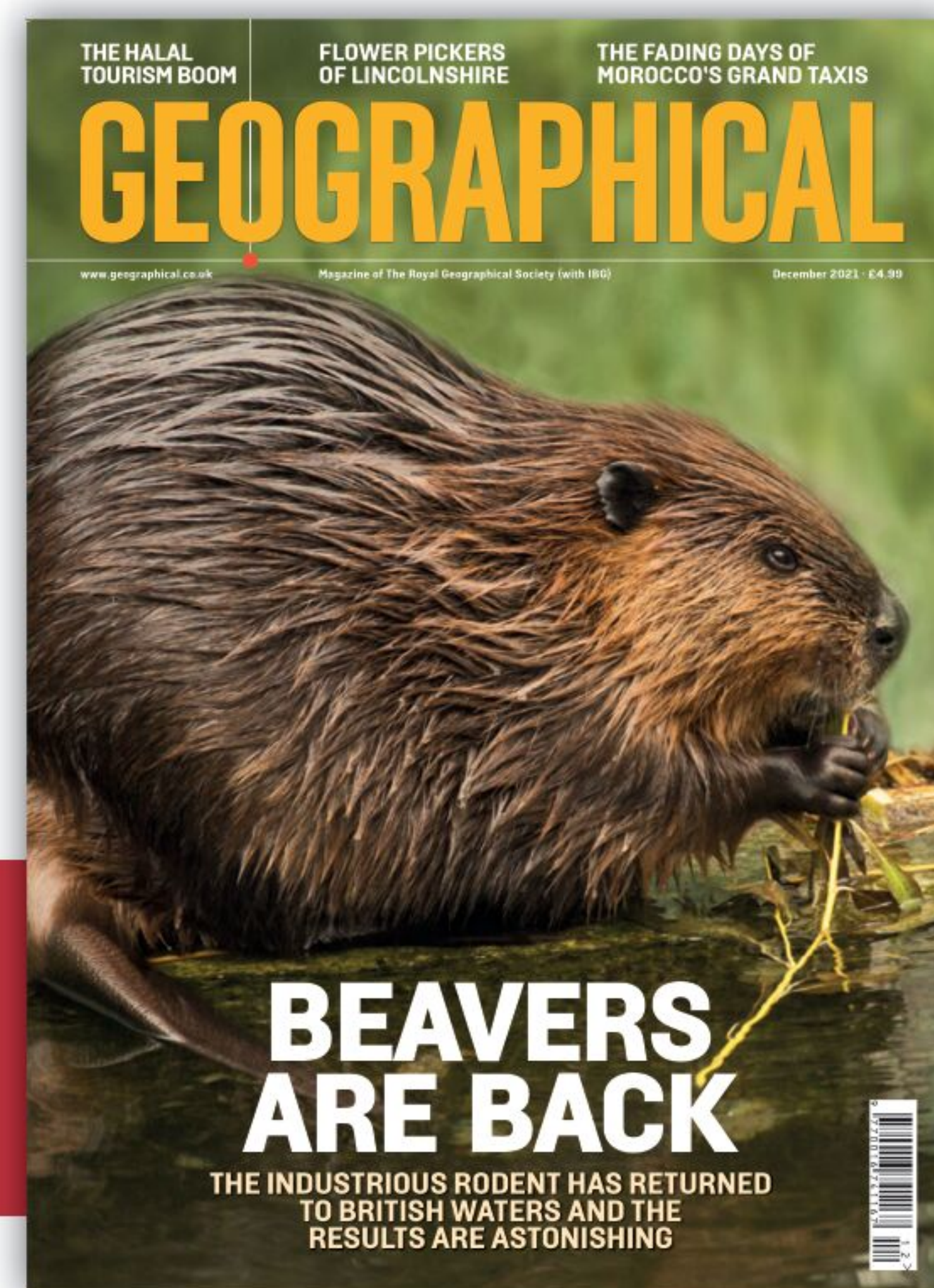
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Easter Island: Father Sebastian Englert

Stockins (1953)

Polynesian seafarers had settled the island of Rapa Nui by around the year 1200. Their journey was quite a feat. Easter Island, as it's commonly known, lies more than 1,930 kilometres from any other populated land. It was these settlers and their ancestors who erected the famous Moai sculptures, which scholars today think represent deified ancestors.

The popular narrative (as famously promulgated by geographer and historian Jared Diamond) then suggests that this society gradually collapsed. By 1600, so the story goes, the Rapanui people were engaged in warfare, cannibalism and population decline. However, more recent archaeological research has cast doubt on this theory, suggesting that the Rapanui weren't destitute at all when the first Europeans arrived and were in fact working and living cooperatively. A consensus has yet to be reached.

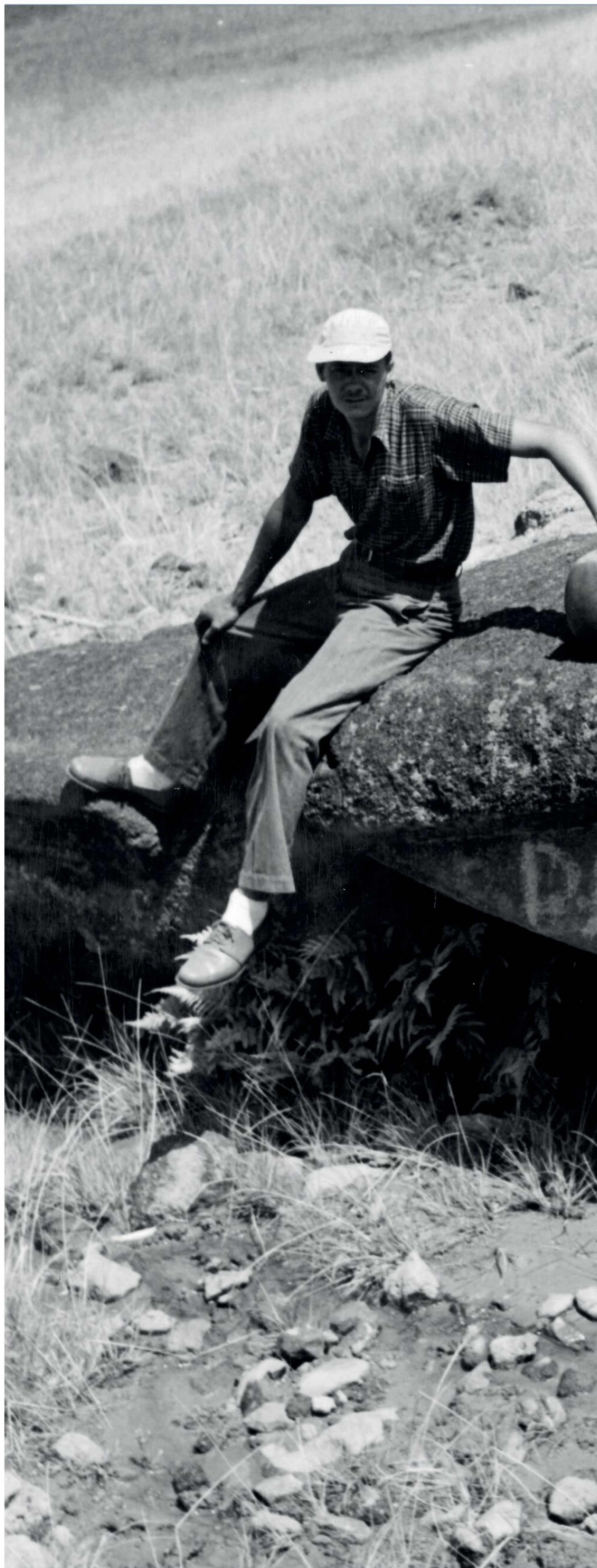
Today, Rapanui culture is still shrouded in mystery. Rongorongo – the forebear of the modern Rapanui language, still spoken by around 800 individuals – is a still undeciphered script. German missionary Father Sebastian Englert, depicted at right with a Moai monolith, was a devotee of the study of Rongorongo and the Rapanui language still spoken today. He lived on Easter Island from 1935 to 1969, during which time he became possibly the only non-Rapanui to master their language. Through his conversations with locals, he deciphered many oral traditions and legends, which he recorded in a dictionary.

Englert stayed true to his missionary objectives, translating popular Catholic devotions into Rapanui in an attempt to convert the locals. According to the historian Steven Fischer, he was also 'strict, authoritarian and patriarchal', prone to weaponising information given to him during confession. Nevertheless, his influence is still felt on the island in the form of the Father Sebastian Englert Anthropological Museum and the continued presence of Catholic worship in some areas. ■

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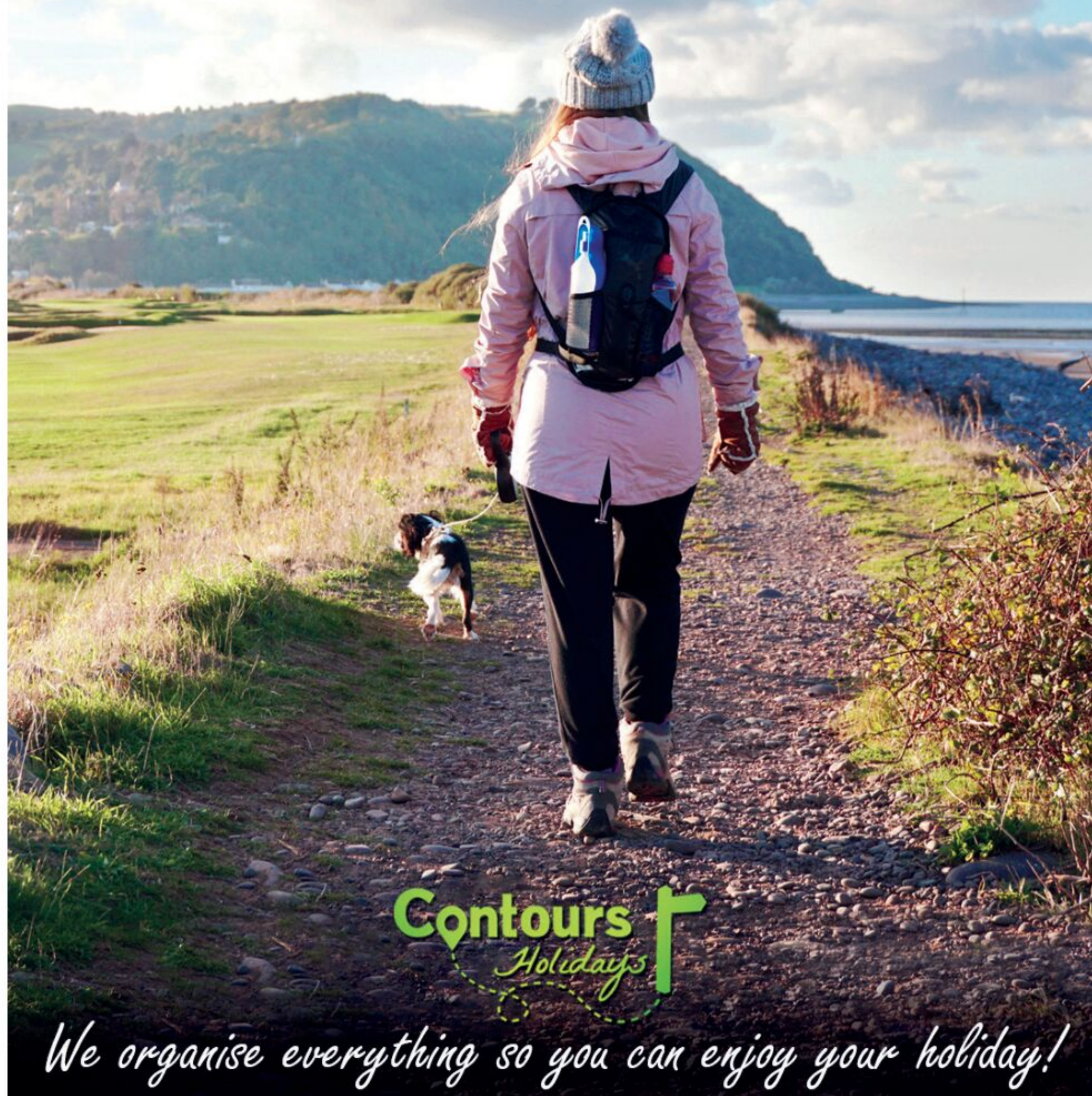


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CURES FROM THE BOG

Pirouetting through a kissing gate tucked into the corner of a rural County Kildare road, you're met with a landscape of subtlety,' writes journalist Lucy Kehoe. 'The bog fans out, grass and sedge quivering above a tightly-woven vegetative tapestry of russet, maroon and myriad greens. Between the low-lying blankets of sphagnum – used in the First World War as an antiseptic wound-dressing – sit diminutive sundew carnivorous plants, round leaves covered in up to 200 crimson, pin-shaped hairs. Each hair glimmers with a glue-like drop of a mucilaginous secretion that entraps unsuspecting insects. This gel-like substance, acidic and

enzymatic, was once a treatment for warts. I scan for the trifoliate leaves of the bogbean, an innocuous plant with white, star-shaped blooms harbouring wiry-haired petals. Its creeping rootstock extends some ten feet into the peat below. The leaves were a cure for inflammation, coughs and – in that vague hygienic vocabulary often encountered in pre-modern medical practices – used to “purify the blood”. We're standing on an ancient pharmacy: one that's about to reopen.'

In next month's issue of *Geographical*, we explore the intriguing potential of this Irish landscape to provide new medicines. Traditionally used for peat harvesting and little else, researchers

are now uncovering its secrets and realising that what South America has in its jungle flora, Ireland may also have hidden away in its bogs.

The project, led by researchers at Trinity College Dublin, marries ethnopharmacology (the history of the plant species used for medical intent) and modern scientific research to find therapeutically active molecules in native bog plants – that is, components with potential medicinal, cosmetic and or food industry uses. If found, active ingredients will be harnessed to develop new economic opportunities for the Irish economy. Over 50 bogland plant species are under evaluation – time will tell if any can yield life-saving substances.

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